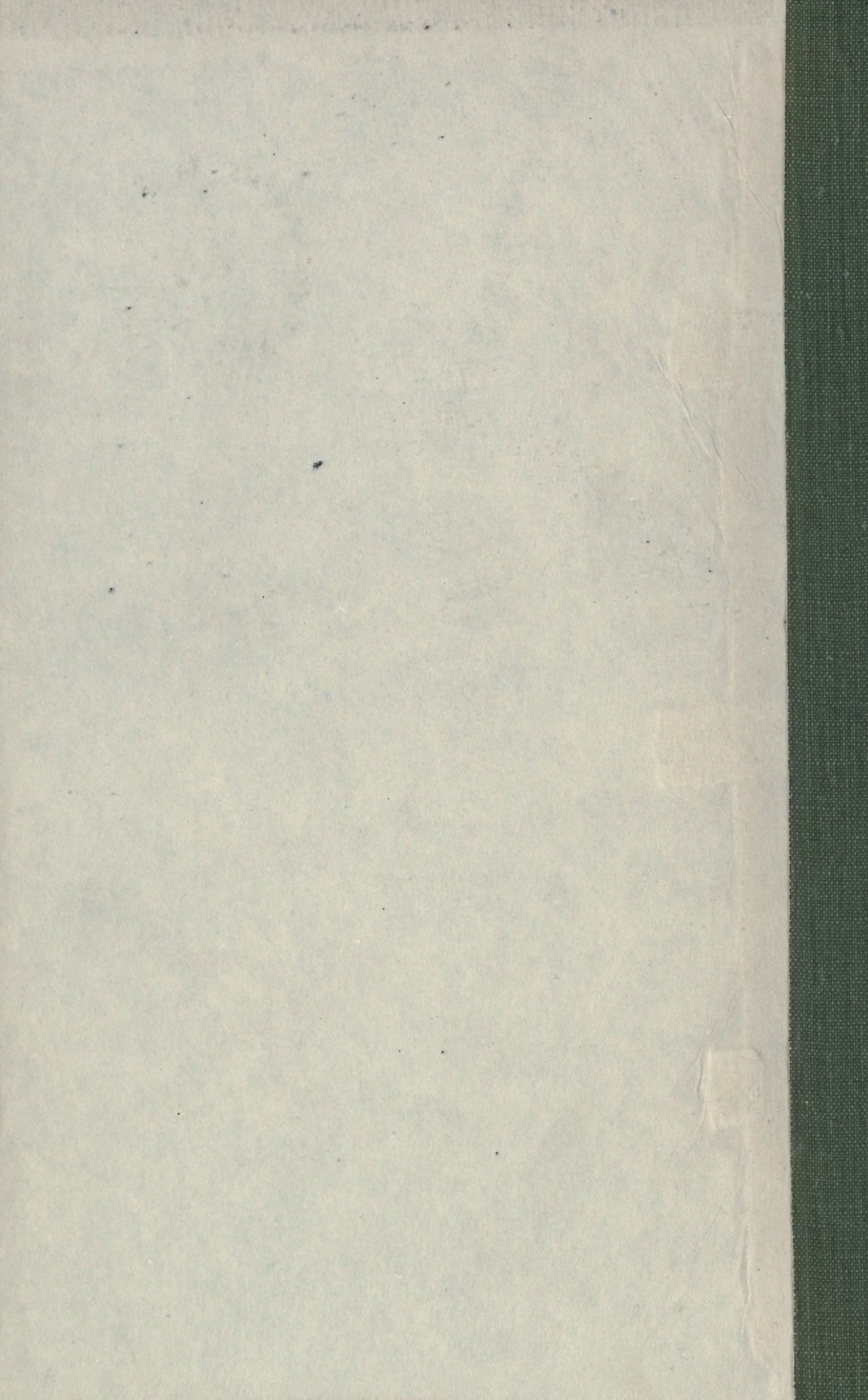


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PLATES IN VOLUME III, 1920

Facing Page

Plate I.	Syphilitic Neuroretinitis and Papilledema (Würdemann), Colors	1
Plate II.	Proliferating Endophlebitis, Retinal Hemorrhage, Absolute Glaucoma. Examination of Excised Globe (Guyton), Colors	112
Plate III.	Anomaly of Fundus (Finnoff) and Tuberculosis of Con- junctiva (Coover), Colors.....	161
Plate IV.	Symmetric Macular Degeneration (Chance), Colors.....	241
Plate V.	Ocular Fundus after Death (Würdemann), Colors.....	321
Plate VI.	Pseudo Tumor of Choroid (Jackson), Colors.....	397
Plate VII.	Pallor of Optic Disc Without Atrophy in a Case of Pituitary Tumor (Benedict), Colors.....	571
Plate VIII.	Multiple Aneurysms of the Retinal Arteries (Fernandez), Colors	641
Plate IX.	Reticular Keratitis (Byers), Colors.....	717
Plate X.	Sections of Tumors of Optic Nerve (Blair).....	794
Plate XI.	Thrombosis of Retinal Veins after Influenza (Jackson), Colors	855

INDEX OF NAMES

- Abadie, C. 238, 557, 638, 714, 850, 915.
 Abelsdorff, G. 316.
 Achard. 640, 785.
 Adam, C. 159, 786, 788.
 Adams, C. J. 72, 159.
 Adams, P. H. 316, 716.
 Adams, W. H. 316.
 Adamson. 714.
 Addison. 476.
 Agatston, S. A. 714, 716.
 Agnostino, A. 158.
 Ahlstrom. 477.
 Aitken, C. J. H. 914.
 Akazuka. 637.
 Alcorta, M. F. 157.
 Alexander, G. F. 914.
 Alexiades. 911.
 Alexowski. 715.
 Allan, J. 315.
 Allen, E. J. 918.
 Allen, F. 557.
 Allen, H. G. 395.
 Allen, H. S. 317.
 Allport, F. 118, 159, 240.
 Alonso, A. F. 238, 476, 850.
 Alt, A. 626, 635, 778.
 Alt, F. 475.
 Amman, E. 316, 640.
 Amsler, C. 911.
 Angelucci, A. 392, 480, 786.
 Appleman, L. F. 296, 476.
 Arenfeld, T. 474.
 Arey, L. B. 78.
 Argañaraz, R. 79, 159, 474, 555, 639, 912,
 Arnold. 317.
 Arnold, J. D. 307.
 Arruga. 78.
 Arsollier. 917.
 Ascher, K. W. 475.
 Ashikaga. 637.
 Ask, F. 156.
 Askey, S. G. 852.
 Astor. 479.
 Atkinson, D. T. 714.
 Aub, J. C. 79.
 Aubaret. 315, 318, 393, 476, 913.
 Aubineau. 640, 851.
 Augstein, C. 316.
 Augstein, H. 395.
 Aurand. 913.
 Aviragnet, Armand-Delville. 912.
 Axenfeld, T. 918.
 Aynesworth, H. T. 912.
 Bab, W. 317, 318, 912.
 Bach, F. W. 639.
 Bailey, J. H. 77, 394.
 Bailliart, P. 238, 316, 638, 476, 557, 851.
 Baker, S. J. 918.
 Baldino, S. 782, 783.
 Bane, W. C. 453, 556, 557, 558, 715, 716.
 Bane, W. M. 783.
 Banister, J. M. 156, 269, 392, 454, 878, 887,
 892.
 Barbe, A. 79.
 Barber, H. W. 158.
 Barbieri, A. 156.
 Barlow, R. A. 79.
 Bard, L. 316, 477, 715.
 Bargo. 912.
 Barker, L. F. 240.
 Barrada, H. 317.
 Barré, J. A. 314, 906.
 Barrial, M. R. 911.
 Barraquer, I. 394, 714, 721, 770, 914.
 Bartolotta, E. 783.
 Barrett, J. W. 285, 915.
 Baslini, C. 314.
 Basterra. 477, 558.
 Bates, W. H. 716.
 Batten, R. D. 53, 55, 80, 144, 157, 159, 240,
 396, 640, 688, 850.
 Battestini. 912.
 Baudouin. 392.
 Baudry, S. 159.
 Bauer, C. 79.
 Baum, O. 850.
 Baumann, C. 316.
 Baumm, H. 912.
 Baute, H. 557.
 Bautzmann, G. 912.
 Bayer, F. 850, 911.
 Bayle, E. 917.
 Bazett, H. 79.
 Bazin, G. 318.
 Beach, S. J. 911.
 Beauvieux. 240, 559.
 Beck, C. 159.
 Beck, J. C. 349, 475, 560.
 Beck, L. K. 393.
 Becker. 915.
 Beckers, H. 314.
 Bedell, A. J. 103, 239, 560, 911.
 Behague. 555.
 Behmann, A. 914.
 Behr. 913.
 Behrman, M. 390.
 Belcher, G. W. 715.
 Bell, G. H. 79, 832.
 Bell, L. 78.
 Beltrao, T. 395.
 Benedict, A. L. 640.
 Benedict, M. K. 850, 913.
 Benedict, W. L. 78, 79, 244, 395, 571, 784
 860, 900.
 Benham, E. W. 157.
 Bennett, A. G. 78.
 Bentzen, C. F. 639.
 Berens, C. 170, 319.
 Berg. 851, 915.
 Berghausen, O. 156.
 Bergmeister, R. 239, 475, 715.
 Berrisford, P. D. 158.
 Berry, G. L. 80.
 Bertram, A. J. 558.
 Best. 79, 852.
 Best, F. 317.
 Bestor, H. M. 782.
 Bethea, O. W. 845.
 Betti, L. 640.
 Bettison, D. L. 395.
 Bettremieux. 238.
 Bevan, A. D. 715.
 Bierende, F. 782, 849.

- Bilancioni. 314.
 Binet, L. 319.
 Binnefeld, M. 316.
 Birch-Hirschfeld. 78, 915.
 Birkhauser, R. 782.
 Birley, J. L. 555.
 Bjerrum. 780.
 Blaauw, E. E. 476, 705, 851.
 Black, M. 621, 782, 889, 894, 898, 900.
 Black, N. M. 560.
 Blair, V. P. 784, 916, 917.
 Blake, E. M. 876.
 Blanc. 673, 913.
 Blanco, T. 841, 914.
 Blaxland, F. G. 640.
 Blegvad, O. 79, 475.
 Blegvad, A. N. R. 558.
 Bleisch. 317.
 Bliss, E. W. 476.
 Bloch, C. E. 783.
 Blohmke. 79.
 Bluemel, C. S. 477.
 Blumenthal, W. 850.
 Boegehold, H. 782.
 Boenheim, E. 917.
 Boez. 395.
 Bogardus, F. B. 661, 850.
 Böhm. 476.
 Bohm, F. M. 913.
 Bollack, J. 79, 239, 477, 558, 638, 640, 715, 716, 841, 849.
 Bolten, G. C. 315.
 Bond, C. J. 479.
 Bond, E. D. 319.
 Bonnefon, G. 77, 471, 479, 556, 713, 913, 914.
 Bonneton. 475.
 Bordeaux, L. 363.
 Bordes, M. L. Q. 158.
 Bordier. 475.
 Bordley, J. 851.
 Borello, F. P. 393.
 Borries, G. V. T. 912.
 Botteri. 638.
 Bottner. 716.
 Boudreau, F. G. 716.
 Bourgeois, A. 238, 476, 715.
 Bourland. 77.
 Bovero, A. 637.
 Bowdler, A. P. 319.
 Boyd, E. T. 134, 239, 376, 558, 618, 783, 821, 913, 917.
 Boyd, W. 319.
 Brailey, A. R. 319.
 Braisted, W. C. 475, 479.
 Bram, I. 559.
 Brandes. 366, 559.
 Brav, A. 80, 605, 784.
 Breaks, L. Z. 711.
 Brearley, E. A. 558.
 Bresler, J. 853.
 Brewerton, E. 475, 906.
 Brieux, E. 475.
 Brill, E. 639.
 Broad, W. H. 319, 476.
 Brose, L. D. 158.
 Bross, K. 852.
 Brown. 394.
 Brown, E. J. 156, 668, 850, 884, 893, 898.
 Brown, E. V. L. 443, 479, 557.
 Browning, S. H. 315, 438, 556.
 Brownlie, W. B. 79.
 Brückner, A. 556, 854, 914, 917.
 Brunetière. 478, 637, 853.
 Buchanan, J. N. 555.
 Buley, E. C. 77.
 Bulson, A. E., Jr. 138, 240, 357, 476, 918.
 Burbage, S. R. 638.
 Burckardi, K. 316.
 Burdon-Cooper, E. 911.
 Burklen. 240.
 Burleson, J. H. 52, 160.
 Burnett, F. L. 849.
 Burnhan, G. H. 805, 917.
 Burrowes, A. 716.
 Busco, J. 317.
 Bussy, G. W. 158, 94.
 Bussy, L. 158, 239.
 Butler, C. 915.
 Butler, T. H. 314, 316, 319, 557, 559, 609, 783, 911.
 Buttel-Reepen, H. V. 158.
 Buxton, L. H. 157, 393, 556.
 Buzzard, E. F. 716.
 Byers, W. G. M. 717, 913.
 Byrne, J. 638.
 Byshowski, Z. 915.
 Bywater, E. N. 316.
 Bywater, H. H. 638.
 Cabannes. 157, 317, 395, 475, 478.
 Cadwalader, W. B. 475, 637, 713.
 Calderon, V. M. 916.
 Calhoun, F. P. 80, 475.
 Calhoun, H. A. 159.
 Callan, L. W. 48, 154, 158.
 Callfass, W. F. 894.
 Camerer, B. 915.
 Cameron, E. H. 851.
 Campbell, C. A. 884.
 Campodonico, E. 913.
 Campos, E. 318, 477.
 Caneja, E. D. 713.
 Carnelli, A. F. 714, 917.
 Canon. 911.
 Cantonnet, A. 156, 237, 315, 316, 320, 392, 475, 477, 555, 637, 639, 913, 914, 915.
 Carrayron, A. 478.
 Carreras, B. 77, 557.
 Carrere, L. 783, 785, 916.
 Carruthers, J. F. 53, 159.
 Carson, W. E. 59, 156.
 Carsten, P. 158.
 Carvalho, J. P. 79, 787, 912.
 Cary, E. H. 160, 559.
 Casolino, L. 853.
 Cassan, E. 237.
 Cassel. 639.
 Cassimatis. 79, 783.
 Castaigne, F. 240.
 Castelain. 240, 716.
 Castellani, A. 478.
 Castro, A. F. 157.
 Cathala, J. 853.
 Cavara, V. 158, 318.
 Cecchetto, E. 783.
 Ceelen. 395.
 Cemach, A. J. 850.
 Chacon, A. 77, 390, 475.
 Chambers, E. R. 478.
 Champlin, H. W. 555.

- Chance, B. 241, 380, 394, 558, 827, 828, 913.
 Chappé. 637, 850.
 Chapusot, C. 479.
 Charbonnel, 821.
 Charles, J. W. 79, 394, 395.
 Charlin. 159.
 Charlton, C. F. 802, 916.
 Charsley, R. S. 687, 853.
 Chase, E. F. 477.
 Chase, S. B. 806, 917.
 Chattaway, F. D. 314.
 Chehnisse, L. 849.
 Chenet. 315.
 Cheron, A. 240.
 Cheval. 915.
 Chevalier. 77, 853.
 Chevallereau. 395, 559.
 Chotzen, T. 395.
 Christian, H. A. 559.
 Christie, C. D. 79.
 Church, B. F. 307.
 Cirincione, G. 78.
 Claiborne, J. H. 558, 852, 912.
 Clapp, C. A. 239, 325, 392, 475, 478.
 Clapp, E. W. 160.
 Clark, B. 850.
 Clark, C. F. 393, 476.
 Clark, J. S. 396.
 Clarke, E. 314, 318, 319.
 Clarke, F. 239, 316.
 Clements, E. C. 320.
 Climenko, H. 478.
 Clopton, M. B. 853.
 Clunet, J. 716.
 Cobb, B. W. 713.
 Cobb, S. 396, 454.
 Coblentz, W. W. 159, 394, 558, 715.
 Cockcroft, W. L. 556, 638.
 Cohen, M. 238.
 Cohn, L. 480.
 Cohn, P. 78.
 Cole, L. J. 477.
 Coleman, W. M. 716.
 Colin, A. 239, 476.
 Collins, E. T. 316, 318, 608, 783.
 Colombo, G. 157, 316, 319, 393, 914.
 Comby, J. 555.
 Comora, A. 394.
 Comstock, C. E. 479.
 Constantin. 237.
 Cooke, T. C. 33, 157.
 Cooper, G. M. 479.
 Cooper, H. J. 394.
 Coover, D. H. 206, 315, 535, 536, 683, 713,
 715, 853, 890.
 Cope, Z. 395.
 Coppez, H. 366, 476, 557, 917.
 Cordes, F. C. 643, 851.
 Cordier. 478.
 Cords, R. 853, 912.
 Corper, H. J. 238.
 Cortes, L. 316.
 Coulomb. 149, 480.
 Cousin, G. 476, 557.
 Coutard. 556.
 Cowan, A. 156, 237, 359, 475.
 Cowdrick, M. 317.
 Cowgill, W. M. 307.
 Craig, J. A. 314.
 Crawley, F. 317.
 Cridland, B. 316.
 Crigler, L. W. 558.
 Crile, G. W. 916.
 Crisp, W. H. 238, 377, 378, 453, 555, 557, 559,
 823, 888, 896, 917.
 Crocco A. 157.
 Crookshank, F. G. 80.
 Cross, E. S. 240.
 Cross, G. H. 762, 914.
 Crossley, E. R. 315.
 Crotti, A. 916.
 Crouzon, O. 555, 849.
 Cruchet. 479.
 Cruise, R. R. 55, 158, 318, 319.
 Cuenod, A. 637, 913.
 Cunningham, J. F. 318.
 Curioni, M. 716.
 Curran, E. J. 476, 557, 638, 914.
 Cushing, H. 715, 912.
 Cutler, C. W. 394, 639.
 Dabney, S. G. 395, 637.
 D'Albe, E. E. F. 918.
 Daloz, E. 917.
 Damel, C. S. 158.
 Dameno, E. 158.
 Dancy, A. B. 917.
 Danis, M. 323, 427, 478, 501, 560, 601, 785,
 915.
 Darier, A. 77, 156, 237, 238, 392, 394.
 Darrieux, J. 637, 853.
 Davids, H. 314.
 Davies, D. L. 476.
 Davis, A. E. 77, 657, 851.
 Davis, S. C. 479, 917.
 Davison, H. P. 777.
 Dean, F. W. 883.
 Debré, R. 475, 638.
 Dechard, H. B. 238, 476.
 Deelman, H. T. 917.
 Degrais, 80, 240.
 Dehogues, H. L. 913.
 Delage, Y. 784.
 Delany, T. H. 315.
 Delorme. 238, 559, 639.
 Demaria, E. B. 157, 393, 395, 476, 556.
 Demoll, R. 918.
 Dénéchau. 640.
 Denes, M. 317.
 Denig, R. 256, 395.
 Dennis, D. N. 497, 714.
 De Pena, P. 478.
 Derby, G. S. 478, 854.
 Dercum, F. X. 638.
 Detlefsen, J. A. 917.
 Detzel. 916.
 Deutsch, E. 349, 479, 560.
 Deutschmann, R. 715.
 Dewaele. 476, 783.
 Dewey, J. H. 526, 714, 767, 914.
 Dewey, K. W. 716.
 Dianoux. 78, 237.
 Dickinson, W. G. 89, 240, 358, 478, 587, 785.
 Didier, P. 559.
 Dietz, A. 316.
 Dimitry, T. J. 240, 314, 477, 640.
 Dinger, J. E. 314, 315.
 Dock, G. 559.

- Doesschate, G. 78, 80, 316, 318, 394, 713, 782, 912.
 Dollken. 237.
 Dolman, P. 77, 258, 392, 555.
 D'Ombraïn, E. A. 638.
 Donaldson, C. A. 159.
 Dor, L. 237, 392, 394, 395, 475, 640, 785.
 Dowling, J. I. 557.
 Doyne, P. G. 688, 912.
 Drachter, R. 395.
 Dragozzi, G. 852.
 Dransart. 637.
 Dresbach, M. 638.
 Druault, A. 396.
 Drummond, W. B. 319, 480, 560.
 Duane, A. 240, 555, 697, 713.
 Dubreuil. 394.
 Ducamp, A. 558.
 Ducatteau, H. 785.
 Duclos. 917.
 Dufour, M. 237, 782.
 Duhamel, A. 79, 785.
 Duhot. 395.
 Dujardin. 147, 785.
 Dumolard, A. G. 784.
 Dundas, G. H. G. 475.
 Dunn, A. D. 917.
 Dunn, J. 556.
 Dunn, P. 77.
 Dunnington, J. H. 912.
 Duperie. 395, 474.
 Dupuy-Dutemps. 852, 912.
 Du Seutre, J. 915.
 Dusser de Barenne, J. G. 314.
 Dutoit, A. 476.
 Duverger, C. 237, 314, 320, 782, 849.
 Dwyer, J. G. 833.
 Eaton. 319.
 Eaton, F. B. 422, 556.
 Ebstein, E. 786.
 Eckstein, A. 713, 784.
 Economo, G. 917.
 Edridge-Green, F. W. 477, 516, 558, 639, 715, 845, 851.
 Edwards, J. D. 914.
 Ehnhuus, E. 240, 395, 475.
 Eigler, C. O. 135, 239, 452, 558, 715, 822, 912.
 Eisner, E. 850.
 Ellett, E. C. 314, 732, 852, 853, 917.
 Elliot, R. H. 156, 393, 480, 783, 911.
 Elmer, W. H. 159.
 Elschmig, A. 315, 395, 913.
 Elworthy, H. S. 392, 912.
 Emard, P. 480.
 Endell. 912.
 Engelking, E. 713, 714, 784, 913.
 Enright, J. 238, 394.
 Enroth, E. 475, 638, 913.
 Eperon. 847, 849.
 Epstein, J. 316.
 Erb, A. 319, 480.
 Erggelet, H. 912.
 Espino, J. M. 80, 916.
 Esser, A. 478.
 Esser, I. F. S. 239, 715.
 Evans, J. J. 80, 317, 320, 476.
 Evans, J. M. 755, 911.
 Evershed. 390.
 Ewing, A. E. 5, 156, 851.
 Faber, O. 314.
 Fage. 239.
 Fagin, R. 395.
 Farnarier. 475.
 Feder, H. 318.
 Fehr, O. 314, 392, 639.
 Feilchenfeld, W. 785.
 Feingold, M. 499, 715.
 Fenton, R. A. 284, 317, 343, 475, 854.
 Fergus, F. 240.
 Fernandez, F. M. 78, 159, 284, 393, 641, 851.
 Fernandez, H. U. 157.
 Ferree, C. E. 24, 158, 159, 335, 408, 475, 555, 715, 772, 784, 812, 911, 915.
 Ferro, P. B. 317.
 Fewell, A. G. 279, 482, 765, 911.
 Fiebiger, J. 639.
 Fiessinger, N. 240.
 Fietta, P. 315.
 Filbry. 471.
 Filehne, W. 915.
 Findlay, E. K. 617, 785.
 Finlay, C. E. 78, 715, 914.
 Finnoff, W. C. 132, 133, 161, 238, 239, 316, 360, 373, 475, 537, 538, 559, 715, 899.
 Fischel, A. 317.
 Fischer, B. 318.
 Fischer, J. 912.
 Fisher, R. A. 395.
 Fisher, W. A. 741, 887, 892, 900, 911.
 Fison, J. 914.
 Fitzgibbon, G. 783.
 Flack. 319.
 Fleck. 393, 395.
 Fleisher. 785.
 Fleisher, B. 157, 768, 783, 913.
 Fleisher, J. 783.
 Fleming, N. B. 158, 438, 559.
 Flesch, J. 392.
 Fletcher, R. 476.
 Flexner, S. 395.
 Folman, M. 315.
 Fontan. 715, 915.
 Foreman. 480.
 Forns. 157.
 Fort, A. G. 716.
 Fossataro, E. 558.
 Foster, N. B. 831.
 Fox, H. 916.
 Fox, L. W. 159, 393, 786.
 Fradkine, S. 79.
 Fraenkel, E. 853.
 Francis, L. M. 291, 395, 872.
 Frank, M. 640.
 Franke, E. 479, 913, 915.
 Franklin, W. S. 643, 851.
 Fraser, A. C. 159.
 Fraudet, H. 318.
 Frazier, C. H. 784, 852.
 Frenkel, H. 316, 716, 785.
 Frias, Onate, A. 77.
 Fridenberg, P. 853, 917.
 Friede. 556, 714, 840, 913.
 Friedenwald, H. 394, 560, 858.
 Frisch, K. 396.
 Fromaget, C. 639, 559.
 Fromaget, H. 639.
 Fuchs, A. 239, 317, 558.

- Fuchs, E. 238, 318, 393, 476, 556, 637, 638,
 713, 714, 715, 716, 850, 851, 852, 853.
 Fulleborn, E. 916.
 Fusita, H. 638.
 Fusiwara, K. 638.
 Fuwagawa, Y. 556.
 Gabrielides, A. 556, 637, 640.
 Galant, S. 916.
 Gallemaerts, E. 237, 365, 555, 713, 835, 911.
 Gallenga, G. 393, 913.
 Gallus, E. 393, 913.
 Gamble, W. E. 617, 785.
 Ganguli, P. 849.
 Garcia del Mazo, J. 157.
 Garcia Mansilla, S. 315, 475, 478, 917.
 Garraghan, E. F. 138, 238.
 Garrahan, J. P. 475, 713, 851.
 Garroud, A. 851.
 Garza, J. U. 851.
 Gaupillat, 77.
 Gaus, 849.
 Gautrand, G. 473.
 Gavezzenski, S. 915.
 Gazepis, Z. 318.
 Gelb, A. 158, 852.
 Gellhorn, E. 915.
 Georgopoulos, S. 315.
 Gerard, M. G. 77, 238, 475, 783.
 Gertz, H. 713.
 Giannelli, A. 478.
 Gibson, J. L. 716, 885, 886, 913.
 Giffo, F. 912.
 Gifford, H. 787, 843, 914, 917.
 Gifford, S. R. 97, 238, 433, 557, 602, 785,
 850, 913.
 Gil, R. 79, 478, 852.
 Gilbert, 914, 918.
 Gilbert, W. 157.
 Gill, A. W. 832.
 Gill, E. G. 637.
 Giltner, H. W. 911.
 Ginsberg, S. 914.
 Girard, P. 716.
 Giori, D. V. 315, 317.
 Giron, J. 319.
 Gjessing, H. G. A. 638, 709, 851.
 Gleichen, A. S. 637.
 Godwin, D. E. 475.
 Goes, M. de. 475.
 Goldberg, H. G. 527, 713.
 Goldenburg, M. 139, 238, 239, 678, 851.
 Goldflam, S. 916.
 Goldsack, L. C. 157.
 Goldscheider, 556.
 Goldschmidt, W. 395.
 Goldstein, K. 158, 852.
 Golseth, G. 238.
 Gomes, P. 318.
 Gonin, J. 57, 158, 558.
 Gonzalez-Alvarez, M. 80.
 Gonzalez, J. de J. 78, 80, 127, 237, 238, 392,
 475, 559, 700, 713, 849, 851, 853, 918.
 Gonzalez Sanchez, P. 852.
 Goodall, E. B. 555.
 Gordon, A. 394, 637, 639.
 Goris, 852.
 Gorst, P. E. 240, 638.
 Goto, 557.
 Gould, G. M. 77, 145, 392.
 Goulden, C. 478, 516, 716.
 Gouvea, H. de. 478.
 Goux, J. L. 75.
 Govens, H. L. 396.
 Gradle, H. S. 41, 157, 560, 818, 853, 914.
 Grafe, E. 849.
 Grasemann, P. 480.
 Greeff, R. 713, 918.
 Green, A. S. 393, 428, 556.
 Green, J. Jr. 477, 479.
 Green, L. D. 393, 428, 556.
 Greene, A. 320.
 Greenwood, A. 285, 396, 478, 480, 918.
 Greenwood, J. 912.
 Grier, G. W. 159.
 Griffith, C. R. 314, 392.
 Grignolo, F. 394.
 Grimsdale, H. 437, 475, 559, 906.
 Griscom, J. M. 827, 913.
 Grober, 782.
 Gros, 783.
 Grosz, E. v. 157.
 Grouvich, A. 475.
 Grünbaum, A. 148, 713.
 Grüter, W. 850.
 Grüter, E. 768, 853, 913.
 Grynfeldt, E. 783, 785.
 Guglianetti, L. 157, 314, 319, 560, 713, 783.
 Guijarro y Carrasco, M. 715.
 Guillain, G. 79, 906.
 Guillaume, A. C. 917.
 Guiral, R. 78, 393.
 Guist, 558, 850.
 Gummich, 785.
 Günther, 639.
 Gutmann, A. 917.
 Guyer, M. F. 560, 917.
 Guyton, B. S. 111, 239.
 Guzman, 556.
 Haas, H. K. de. 316, 639.
 Haenel, H. 915.
 Hagen, S. 913.
 Hagemeyer, A. J. C. 784.
 Hajek, M. 915.
 Hala, W. W. 240.
 Hall, G. W. 476.
 Hallett, De W. 476.
 Halliday, J. C. 885.
 Hambresin, 364, 366, 557.
 Hamill, R. C. 477.
 Hammes, E. M. 319.
 Handmann, 476.
 Hanna, H. 320.
 Hannemann, E. 913.
 Hansell, H. F. 208, 295, 318, 478, 521, 522,
 559, 571, 714, 715, 824.
 Hansen, 479.
 Hanssen, 912, 914.
 Harboe, J. F. 558, 784.
 Hardwicke, W. W. 475, 637.
 Hardy, W. F. 517, 713, 716.
 Haren, 852.
 Harkness, C. A. 396.
 Harman, N. B. 80, 319, 438, 555, 559.
 Harper, G. S. 918.
 Harrington, R. R. 370, 372, 556, 558.
 Harris, 315.
 Harris, J. D. 158.
 Harry, P. A. 80, 475, 913.
 Hartridge, H. 156, 157, 158, 715.

- Haselberg, V. 393.
 Hasselmann. 478.
 Hathaway, W. 396.
 Haughey, I. W. 197, 314.
 Hauss, von. 476.
 Hawthorne, C. O. 480.
 Hay, P. J. 314, 319.
 Hay, J. 785.
 Hayes, S. P. 317.
 Hazen, E. H. 237, 713.
 Heagey, F. W. 917.
 Healy, J. J. 782.
 Hecht, S. 639, 784, 914.
 Heflebower, R. C. 156, 237.
 Hegler, C. 915.
 Hegner, C. A. 316.
 Heidrich, A. 713.
 Heimann, E. A. 392, 713.
 Henderson, E. E. 239, 317, 785.
 Henker, O. 156.
 Henning, H. 716.
 Hensen, H. 319, 782, 849.
 Hepburn, M. 79, 144, 239.
 Herbert, H. 238, 316, 476.
 Hering, E. 911.
 Herrenschwand, F. v. 478, 640, 917.
 Hershberg, H. 80.
 Hertz, V. 912.
 Hess, C. v. 475, 783, 784, 911, 918.
 Hessberg, R. 714, 785, 853.
 Heusen. 852.
 Higgens, C. 475.
 Higgens, S. G. 373, 560.
 Hijikata, Y. 78.
 Hikita, N. 639.
 Hilbert. 475.
 Hill, E. 475.
 Hill, W. W. 80.
 Hilton, H. O. 240.
 Hine, M. L. 146, 318, 394, 688, 852.
 Hinojar. 852.
 Hinrichs, S. 913.
 Hippel, E. v. 395.
 Hird, R. B. 317.
 Hirsch. 239, 917.
 Hirsch, G. 784.
 Hirschberg, J. 80, 157, 476, 479, 480, 638, 639.
 Hirscl. 914.
 Hiwatari, K. 78, 157, 238, 556.
 Hochgurtel, M. 392.
 Hoeg, N. 475, 915.
 Hoeve, J. van der. 178, 314, 316, 319, 555, 911, 916.
 Hoezknecht. 159.
 Hofman, F. B. 784.
 Hogue, G. I. 80, 159, 319, 782.
 Holban, D. 315.
 Holloway, T. B. 297, 380, 381, 476, 555, 557, 558, 765, 824, 826, 911.
 Holm, E. 638, 639, 783, 914.
 Holmes, C. R. 154, 307.
 Holth, S. 146, 911.
 Homver, M. 318.
 Hoor, K. von. 157, 913.
 Hoover, C. F. 916.
 Hori, S. 77.
 Horn, H. 237.
 House, W. 237.
 Howard, C. N. 332, 559.
 Howard, H. J. 77, 417, 475, 555, 589, 702, 713, 784.
 Howe, L. 291, 396, 479, 480, 912.
 Hubeny, M. J. 559.
 Hueber, A. A. 701, 852.
 Hughes. 783.
 Hughes, H. S. 713.
 Hunt, E. L. 79.
 Hunter, E. L. 850.
 Huppenbauer, K. 315.
 Hurst, A. F. 784, 832.
 Hyatt, E. G. 850.
 Hyde, E. P. 713.
 Ichikawa, K. 477.
 Ide, C. E. 237.
 Igersheimer, J. 317, 560, 639.
 Imamura, S. 477.
 Imbert. 159.
 Ingersler, F. 637.
 Ingham, S. D. 784.
 Iredell, C. E. 77.
 Irvine, A. R. 238.
 Irwin, S. V. 240.
 Isola, A. 915.
 Israel, E. B. 853.
 Jackson, E. 70, 80, 150, 153, 158, 160, 239, 240, 302, 304, 384, 386, 392, 393, 397, 480, 548, 549, 555, 557, 560, 626, 627, 629, 705, 708, 713, 716, 774, 782, 786, 788, 844, 851, 853, 855, 894, 895, 897, 902, 904, 906, 907, 911, 914, 918.
 Jackson, T. S. 852.
 Jacovides. 318.
 Jacqueau. 639, 715.
 Jaensch, E. 852.
 Jakob, H. 918.
 James, R. R. 79.
 James, W. B. 833.
 Janacek, R. 851.
 Janeway, H. H. 555.
 Janzen, E. 851.
 Jeandelize, P. 318, 713, 715, 912.
 Jennings, J. E. 553, 915.
 Jeremy, H. R. 54, 159.
 Jervey, J. W. 850, 913.
 Jess, A. 703, 713, 715, 716, 853, 911, 914.
 Jickeli. 913.
 Jobson, J. B. 293, 393.
 Jocsq, R. 715, 784.
 Johnson, H. M. 476.
 Joly, J. 317.
 Jones, E. L. 392, 455.
 Jones, R. H. 559.
 Jordan, A. 238.
 Jorge, J. M. 158.
 Joughin, J. L. 240.
 Juarros, C. 853.
 Judd, E. S. 852.
 Junius. 917.
 Kahn, R. H. 638, 913.
 Kalt. 559.
 Kammerer, P. 639.
 Kan, P. T. L. 912.
 Kappers, A. 639.
 Karelus. 315.

- Karrer, E. 914.
 Katheriner, L. 918.
 Kato, T. 913.
 Katz, J. 77.
 Kearney, J. A. 80, 854.
 Keen, A. 396.
 Keller, K. 852.
 Kelly, H. A. 846.
 Kennon, R. B. 697, 715, 716.
 Kenny, A. L. 885, 918.
 Kerbrat, Y. V. J. 317, 914.
 Kern, B. v. 314.
 Kerr, D. 395.
 Kerry, R. 341, 476.
 Kestenbaum, 783.
 Key, B. W. 78.
 Key, S. N. 684.
 Keyser, 395.
 Kiefer, H. A. 157.
 Kiep, W. H. 319.
 Killen, W. M. 316.
 Kirchner, M. 157.
 Kirkpatrick, H. 157, 556, 558.
 Kirschmann, A. 315.
 Kisch, B. 785.
 Kiss, J. 849.
 Kjolbye, J. 639.
 Klauber, E. 478, 913, 917.
 Kleefeld, G. 237, 365, 478, 555, 556, 849.
 713, 835, 911.
 Kleijn, A. de. 314, 782, 784.
 Klock, von. 475.
 Kluge, A. 783.
 Knack, 914.
 Knapp, A. 79, 87, 238.
 Knapp, P. 916, 917.
 Knorr, E. A. 393, 394.
 Koby, E. E. 314, 637.
 Koegel, H. 77, 911.
 Koeppe, L. 555, 637, 638, 784, 911.
 Koerber, 478.
 Köfler, A. 477.
 Köfler, K. 478.
 Koller, C. 238.
 Köllner, H. 474, 475, 777, 913, 916.
 Kolmer, W. 640.
 Komoto, 638, 639.
 Kooy, J. M. 393.
 Koster, W. 911.
 Kosterlitz, T. 479.
 Kraemer, 914.
 Kraupa, E. 318, 396.
 Kraupa-Runk, M. 158.
 Krauss, F. 66, 166, 317, 379, 558, 715.
 Krebs, A. 441, 559.
 Kreidlova, A. 850.
 Kretschmer, 478.
 Krinsky, J. 475.
 Krückmann, 159, 639, 914.
 Kruse, F. W. 783.
 Krusius, F. F. 396.
 Kubik, J. 916.
 Kuboki, H. 638.
 Kuhl, A. 912.
 Kuhlefeldt, E. 396.
 Kuhnt, 157.
 Kümmell, R. 477, 479.
 Kuznitsky, E. 395.
 Kyle, J. J. 847.
 Lacah. 639.
 Laconture. 852.
 Lacroix, A. 318, 479, 715, 915.
 Lafarque. 240, 716.
 Lafon, C. 77, 298, 471, 555.
 Lagarde. 912.
 Lagrange, F. 80, 239, 316, 318, 395, 557, 851.
 Lagrave, E. J. 917.
 Lahey, F. H. 478.
 Laignel, L. 912.
 Laiseca, N. F. 157.
 Lal, B. H. 914.
 Lamb, A. R. 913.
 Lamb, R. S. 394, 459, 888, 891, 893, 896, 900.
 Lampert, P. 478.
 Lancaster, W. B. 394, 457, 480, 849.
 Landolt. 363, 555.
 Landolt, E. 317.
 Landolt, M. 8, 237, 238, 475.
 Lane, F. 78.
 Lang, B. T. 77, 314.
 Langdon, H. M. 527, 716.
 Langmead, F. S. 396.
 Langrock, C. 916.
 Lanier, L. H. 394.
 Lantuejoul. 392.
 Lapersonne, F. de. 77, 80, 159, 239, 240, 318,
 362, 393, 479, 559, 560, 640, 716, 785, 850, 853.
 Larkin, B. J. 392.
 Larsen, H. 639, 716, 916.
 La Rue. 134, 240.
 Latil. 157.
 Lauber, H. 475, 638, 850.
 Laurance, L. 782.
 Laval, F. 319.
 Lawford, J. B. 392.
 Lawson, A. 317.
 Layson, Z. C. 433, 559.
 Lea, J. A. 849, 850.
 Leavitt, M. J. 237.
 Lecene, P. 477.
 Lederer. 317.
 Lehmann, R. 917.
 Leidler, R. 912.
 Lemmer, L. 475.
 Lemoine, P. 639, 715.
 Le Pendu. 157.
 Leplat, G. 366, 479, 559, 852, 853.
 Lereboullet, P. 917.
 Leri. 237.
 Leriche, R. 916.
 Le Roux, H. 395, 851.
 Letulle, M. 716.
 Levin, I. 392.
 Leventhal, J. H. 77.
 Levinsohn, G. 78.
 Lian, C. 853.
 Libby, G. F. 373, 477, 556, 559.
 Liddell, H. S. 77.
 Lidwill, M. C. 77.
 Liebermann, L. 159.
 Liégard. 79, 395.
 Lindahl, C. 318, 637, 784.
 Lindberg, J. G. 556.
 Lindgren. 238, 298, 476, 639, 787.
 Lindner. 238, 852, 913, 917.
 Lister, A. E. J. 78, 914.
 Lister, W. T. 146, 318.
 Litvak, A. 849.
 Llwelllyn, T. L. 237, 392, 849, 854, 912.
 Lloyd, J. H. 319.

- Lloyd-Owen, D. C. 240.
 Lobel, A. 470.
 Lockhart, R. 556, 560.
 Loeb, C. 121, 240, 293, 299, 381, 475, 845, 902, 904, 918.
 Loeb, H. W. 913, 915.
 Lockwood, R. M. 475.
 Lodge, O. 317.
 Löhlein, W. 480, 637, 916.
 Lohmann, W. 915.
 Lombardo, M. 747, 912.
 Lomon, 559.
 Longcope, W. T. 831.
 Looper, E. A. 394.
 Lopes, L. 480.
 Lortat-Jacob, L. 912.
 Losno. 913.
 Lottrup-Anderson, C. 78, 237, 475.
 Loughborough, G. T. 853.
 Love, L. F. 290, 395, 782.
 Lowe, L. 479.
 Lowell, W. H. 275, 393.
 Löwenstein, A. 78, 475, 476, 639, 716, 769, 913.
 Lowenstein-Brill. 639, 915.
 Lowery, L. G. 850, 913.
 Luc, L. 476.
 Luckiesh, M. 240.
 Luedde, W. H. 238.
 Lundsgaard, K. K. 912.
 Lüssi, W. 476.
 Lynch, R. C. 318.
 McAll, P. L. 159.
 MacAuliffe. 917.
 MacCallan, A. F. 240, 769.
 McCaw, J. A. 131.
 McDavitt, T. 556, 558, 559, 560.
 McDonnell, W. C. 80.
 Macfie, J. W. S. 556.
 McGuire, H. H. 315, 850.
 McHenry, D. D. 917.
 McIlroy, J. H. 480, 560.
 McIntire, C. 309.
 Mackay, H. 237.
 McKee, S. H. 239, 394.
 McKellar, J. H. 209, 318, 603, 784.
 McKenzie, D. 396, 852.
 McKeown, E. E. 132, 239.
 McLean, W. 557.
 Macleod, G. 393, 395.
 MacLeod, R. A. 784.
 McMillan, A. L. 916.
 McMullen, J. 54, 159.
 McMullen, W. H. 516, 687, 688, 714, 716, 852, 853, 913.
 McMurtrie, D. C. 480.
 McPherson, G. 240.
 McReynolds, J. O. 900.
 Machts, L. 918.
 Maddox, E. E. 23, 156, 475, 556, 911.
 Maderna, C. 637.
 Maggiore, L. 640.
 Maghy, C. 444, 533, 557, 714.
 Magill, E. M. 480.
 Magitot, A. 238, 239, 475, 638, 714, 784, 851.
 Magruder, A. C. 377, 557, 611, 620, 785.
 Mahoney, G. W. 784.
 Majewski. 237, 395.
 Malagodi, A. 156, 392.
 Malling, B. 79.
 Malvoz. 475.
 Mancini, U. 853.
 Mangini, L. 477.
 Mann, L. 394, 851.
 Mann, R. T. 850.
 Manóia. 314.
 Manson, M. A. 479.
 Mansur, L. W. 476.
 Marbaix. 238, 475, 714, 853.
 Marbourg, E. M. 67, 158.
 Marburg, O. 784.
 Marechal, H. 237.
 Margarot, J. 479.
 Margarucci. 473.
 Marie, P. 785, 906.
 Marin-Amat, M. 559, 640, 853.
 Marine, D. 916.
 Marinosci, R. 157.
 Marks, E. O. 886.
 Marlow, F. W. 392.
 Marongiu, L. 395.
 Marquez. 79, 479.
 Martel, P. 480.
 Martens. 918.
 Martin, A. 80.
 Martin, H. H. 558, 559, 560.
 Martin, L. C. 716.
 Martin, M. J. 479.
 Marx, E. 850, 911, 918.
 Mas Soewarno. 78, 914.
 Masuda, T. 558, 638, 639.
 Matsuoka, Y. 564, 783.
 Matthews, R. H. 317.
 Mawas. 559.
 Maxey, E. E. 80, 239.
 Maxted, G. 159, 912.
 Maxwell, E. 315.
 Maynard, F. P. 146, 238, 555, 640.
 Mayou, M. S. 314, 317, 318, 786.
 Mazerés, G. 637.
 Mazzel, A. 158, 393, 476, 557, 558, 783, 835, 918.
 Meade, J. N. 80.
 Means, J. H. 79.
 Meder. 475.
 Meirello, E. 158.
 Meisling. 637.
 Meissner, M. 784, 854.
 Meller, J. 640, 784, 917.
 Mello, G. de. 475.
 Menacho, M. 78, 157, 393, 478, 640, 785, 913.
 Mendel, F. 477.
 Mendoza, R. 77.
 Merg, H. 918.
 Merida, N. 556.
 Metty, 237, 394, 918.
 Metzger, I. D. 782.
 Meyer. 638.
 Meyer, G. 714.
 Meyer, H. 394.
 Meyer, R. C. J. 479.
 Meyerburg, v. 852.
 Myerhof, M. 320.
 Meyling, H. J. 395.
 Mezincescu, D. 315.
 Michel, R. 918.
 Millan, G. 237.
 Miller, C. M. 238.
 Miller, E. B. 782, 783, 785, 850, 918.

- Mingazini. 852.
Molinie. 849.
Monauni, C. 395, 785, 787, 839, 917.
Monbrun, A. 238, 239, 477.
Monchy, S. J. R. de. 639.
Mongel, E. B. 763, 915.
Montaño, E. F. 475, 849, 851.
Mooney, H. C. 315.
Moore, R. F. 916.
Morax, V. 316, 318, 319, 477, 478, 559, 561, 639, 716, 783.
Moreau, F. 240, 394, 784.
Morgan, A. D. 716.
Morrison, F. A. 685.
Morton, H. McI. 402, 556.
Morse, S. 555.
Mosher, H. P. 394.
Moss, L. 156.
Motais. 318, 880.
Motolese, F. 318.
Moulton, H. 850.
Moure, P. 319.
Monquet, A. 912.
Mukai, H. 637, 913.
Muller, E. 782, 784.
Muller, L. 475, 911, 913.
Muller, M. 318, 915.
Murray, A. N. 141, 240.
Muskens, L. 852.
Mussio-Fournier, J. C. 915.
Myake, Y. 638.
Myashita, S. 556, 638.
Mygind, S. H. 478.
Nadal, R. 392, 851.
Naegeli. 479.
Nagel, C. S. G. 239, 327, 406, 473, 559.
Nager. 317.
Nakamura, B. 472, 638.
Natale. 158.
Neeper, E. R. 66, 157, 159.
Neill, W. 159.
Nelson, V. E. 913.
Nestlinger. 783, 913.
Netter. 319.
Netto, C. 314.
Neubner, H. 317.
Neunhoeffer. 715.
New, G. B. 244, 395.
Newcomb, J. R. 392, 396.
Nicati, A. F. 851.
Nicolle, C. 393, 637, 913.
Nicolet. 912.
Nicolau. 157.
Nicolich, M. 157, 393.
Nicolls, F. 157.
Nordenson, J. W. 79, 914.
Norris, C. 394.
Nunes. 477.
Nutting, P. G. 558.
Oblath, O. 395.
O'Brien, J. A. 80.
Ochoterena, I. 317.
Ochsenius, K. 318.
O'Connor, R. 116, 237, 726, 914.
Odeneal, T. H. 80.
Oertel, T. E. 814, 916.
Oesterreicher, L. 79.
Oettingking, B. 159.
Offret. 395, 556, 559, 716.
Oguchi, C. 558, 637.
Ohno. 559.
Ohsaki. 557.
Okamura, S. 637.
Okasaki, G. 315, 638.
Olenchiu. 638.
Oliver. 80, 744.
Oliveres. 316.
Oloff, H. 79, 159, 915.
Olsho, S. L. 481, 713.
Onishi, K. 639, 640, 839, 918.
Oppenheimer, S. 640.
Oreste, A. 393.
Ormond, A. W. 687, 853.
Ourgaud. 157, 159, 318, 476, 913.
Oyenard, A. 158.
Paderstein. 913.
Pagniez, P. 785, 851.
Paillard. 853.
Palich-Szanto, O. 913.
Paneth, L. 475.
Paraf, J. 471, 638, 713, 785.
Pardee, I. H. 477.
Park, J. W. 638.
Parker, R. H. 393.
Parker, W. R. 284, 736, 915.
Parsons, J. H. 54, 158, 319, 320, 475, 515, 639, 714, 715, 784.
Passow, A. 913.
Paton, L. 318, 515, 516, 713, 714.
Patterson, J. A. 135, 238, 240, 896.
Patterson, W. E. 640.
Patton, J. M. 786.
Pauly, R. 156, 392.
Pearson, A. 396, 480.
Pearson, W. W. 849.
Pech, C. R. 477, 715.
Pech, J. S. 715.
Pedarre, M. J. J. A. 714.
Peirson-Webber, F. 560.
Pelayo. 156.
Pelfort, C. 77.
Percival, A. S. 80.
Pereyra, G. 318, 394, 473.
Perol, B. 318.
Perrin, T. G. 157, 918.
Perry, T. E. 557.
Pesme, P. F. 479, 912.
Peter, L. C. 239, 295, 296, 392, 477, 524, 557, 584, 713, 782, 911.
Peters, A. 783.
Peters, R. 479.
Peyrelongue, E. de. 396, 714, 916.
Pfeiffer. 77.
Pfingst, A. O. 129, 237, 560, 716.
Phelps, K. A. 39, 156.
Phillips, W. H. 851.
Pichler, A. 157, 158, 479, 786.
Pick, A. 852, 915.
Pick, L. 560.
Pieron, H. 784.
Pincus, F. 158.
Pischel, K. 238.
Pissarello, C. 157, 393, 783, 913.
Pitschack. 479.
Place, R. W. 686, 849.
Pockley, F. A. 393.
Pockley, G. A. 393, 559, 639.
Poisson. 473.
Polack. 558.
Pollock, W. B. I. 315.

- Pollot, W. 912.
 Portman, G. 916.
 Portillo, J. W. 78.
 Posey, W. C. 206, 394, 507, 523, 557, 693,
 714, 761, 762, 852, 853, 911, 916.
 Possek, R. 392, 479.
 Post, L. 911.
 Post, M. H. 277, 393.
 Potts, G. 78, 143, 238, 239.
 Potts, H. A. 394.
 Potts, J. B. 195, 319.
 Pötzl, O. 317.
 Poulard, 78, 557, 558, 559, 639.
 Poyales, F. del. 394, 478, 639, 917.
 Prates, M. M. 916.
 Prélat, 77.
 Prevedi, G. 156.
 Prince, A. L. 77.
 Pronger, C. E. 782.
 Pulleine, R. 637.
 Purtscher, O. 238, 477, 479, 715, 911.

 Quick, D. 558.

 Rabl, G. 317.
 Rados, A. 914.
 Ralston, W. 393.
 Ramon, C. V. 783.
 Ramsay, A. M. 480, 560, 915.
 Rand, G. 24, 158, 159, 335, 408, 475, 555,
 715, 784, 812, 911.
 Randolph, R. L. 75.
 Raoulx, 394.
 Rasquin, E. 147, 475, 785, 913.
 Rauch, R. 158, 473.
 Raueiser, A. 318.
 Raulston, B. O. 477.
 Ravdin, B. D. 159.
 Ravoux, P. 560.
 Raynor, W. P. 315.
 Redding, L. G. 555.
 Redfern, T. C. 639.
 Redslob, E. 786.
 Reed, C. B. 918.
 Reed, C. I. 395.
 Reeder, J. E. 852.
 Reese, R. G. 832, 853.
 Rehm, O. 849.
 Reiche, O. C. 638.
 Reid, H. 917.
 Rejto, A. 849.
 Remak. 713.
 Rendleman, W. H. 559.
 Rennie, G. E. 79.
 Ribon, V. 79, 80, 555.
 Riddoch, G. 852.
 Ridley, N. C. 478.
 Riedel, A. H. 79.
 Ring, G. O. 529, 714.
 Rinkes-Huygen, A. C. 694, 850.
 Risley, S. D. 297, 356, 475.
 Riva, G. 475, 638.
 Robert, G. 849, 911.
 Roberts, B. H. St. C. 314, 317.
 Robertson, E. N. 820, 914.
 Robin, E. A. 913.
 Rocha, N. da. 479.
 RoCHAT, G. F. 317.
 Rocher, L. 715.
 Rochon-Duvigneaud, A. 159, 240, 786, 853.

 Roelofs, C. O. 770, 784, 911.
 Roemhold, L. 853.
 Rohde, M. 853.
 Rohr, M. 80, 316, 912, 918.
 Rolandi, S. 716.
 Roll, G. W. 437, 557, 687, 850.
 Rollet, E. 395, 638, 474, 914.
 Romer, P. 240, 393, 478.
 Romulo, G. 478.
 Roubinovitch, J. 849.
 Ronchetti, V. L. O. 918.
 Rönne, H. 149, 638, 701, 850, 912, 914, 915.
 Roorda-Smit, J. A. 393.
 Rosenblatt, S. 918.
 Rosenheck, C. 158.
 Rousseau, R. 80, 239, 240.
 Rowan, J. 608, 783.
 Roy, D. 80.
 Rozsa, J. 475.
 Ruiz, J. M. 77.
 Ruiz, R. G. 785.
 Rumber, W. 318.
 Rush, C. C. 869, 816, 914.
 Russ, S. 317.
 Rutherford, W. J. 557.
 Ruttin. 556, 852.
 Ryley, C. M. 77.

 Sadek, M. T. 318.
 Saenger, A. 394, 852.
 Sage, F. C. 476.
 Saint-Martin, de. 317, 394, 396, 477, 560, 783.
 Sakaguchi, K. 637.
 Salisbury-Sharpe, W. 916.
 Salterain, J. de. 78, 316, 477, 479, 716, 915.
 Salus, R. 315, 395.
 Salzmann, M. 477.
 Samaja, N. 916.
 Sandiford, I. 559.
 Santa-Cecilia, J. 912, 918.
 Santonoceto, O. 392.
 Santos-Fernandez, J. 78, 79, 80, 477, 696,
 851.
 Santanowsky, P. 318.
 Sattler, R. 714, 917.
 Sauer, W. E. 852.
 Sauvinau. 393, 556, 716.
 Scarlett, H. 396, 454, 63, 159.
 Schaeffer, G. P. 394.
 Schanz, F. 911.
 Scheerer, R. 915.
 Scheffer. 77.
 Scherzer. 917.
 Schiassi, B. 916.
 Schieck. 393.
 Schiötz, H. 475, 557.
 Schiötz, I. 784.
 Schmalfuss, G. 916.
 Schmidt, F. F. 665.
 Schmidt, H. 477.
 Schnaudigel, O. 714, 840, 911, 913.
 Schneider, R. 912.
 Schneider, W. F. 475.
 Schoenberg, M. J. 477.
 Schorn. 392.
 Schottenheim, O. 156.
 Schreiber, L. 158.
 Schriftleiter. 713.
 Schruhoff. 393.
 Schulz, H. 158.

- Schurmann, F. 784.
 Schutz, W. H. 475.
 Schwarzkoff, G. 916.
 Schweinitz, G. E. de. 64, 65, 157, 394, 560.
 Schwenk, P. N. K. 65, 156, 295, 475, 758, 914.
 Scolari, E. 78.
 Scott, E. 665, 853.
 Sulco. 78.
 Sedan, J. 395, 475.
 Seddik, Z. 316.
 Sedwick, W. A. 130, 448, 557, 619, 785, 823, 911.
 Seefelder, R. 479, 850.
 Seeman, M. 916.
 Seidel, E. 317.
 Seimemi, E. 158, 159.
 Sendral. 239, 318, 362, 785.
 Senet, R. 79.
 Severin. 392.
 Sewall, H. 865, 895.
 Sexton, E. W. 918.
 Seyster, E. W. 396.
 Sgroso, S. 158, 394.
 Shahan, W. E. 914.
 Shanklin, E. M. 285, 396.
 Shannon, J. R. 315.
 Sharp, W. N. 314, 434, 560, 597, 782.
 Shastid, T. H. 109, 239, 307, 631.
 Sheard, C. 396, 558, 782, 783.
 Sheppard, H. 715.
 Shields, J. M. 238, 377, 449, 450, 556, 557, 560, 822, 914.
 Shima. 316.
 Shimazu, F. 639.
 Shoemaker, W. T. 63, 159, 477, 528, 714.
 Shumway, E. A. 523, 714.
 Shute, A. C. 480.
 Sicard, J. A. 785, 918.
 Sichel, A. W. 558.
 Siciliano, L. 237, 393.
 Sidler-Huguenin. 474, 560.
 Silva, L. 783.
 Silvero, J. E. L. 80.
 Silvio, F. 157.
 Simon de Guilleuma, J. M. 639.
 Simpson, W. H. 558.
 Sinclair, A. H. H. 911.
 Sinclair, W. 319.
 Sinha, C. C. 913.
 Sistrunk, W. E. 239.
 Skversky, O. 80.
 Sloan, H. L. 852.
 Slonaker, J. R. 798, 918.
 Small, C. P. 78.
 Smati, A. 237.
 Smith, C. M. 240.
 Smith, D. T. 784.
 Smith, E. T. 239, 640, 853.
 Smith, H. E. 238, 314, 317, 637, 673, 851.
 Smith, R. C. 109, 239.
 Smith, T. 395.
 Smith, V. C. 318.
 Snell, A. C. 560.
 Snyder, W. H. 714.
 Snyder, E. F. 612, 785.
 Soewarno. 78, 914.
 Solares, F. V. 315.
 Sonder. 555.
 Sonnen, A. 916.
 Soria y Escudero. 475.
 Soriano, F. J. 159.
 Spaeth, E. B. 716.
 Spalding, J. M. 156, 159.
 Spearman, C. 320.
 Spencer, F. R. 134, 240.
 Spicer, W. T. H. 850.
 Spiller, W. G. 315.
 Spring, J. F. 319.
 Stack, E. H. 319, 911.
 Stahl, R. 849.
 Stahlman, F. C. 849.
 Staicovici, N. 475.
 Stajduhar, J. 850.
 Stargardt. 639.
 Starck. 851.
 Stark, H. H. 262, 396, 918.
 Stassen, M. 156, 475.
 Steen, V. 911.
 Steiger, A. 912.
 Stein, J. 440, 560.
 Steinberg, A. 392.
 Steinert, E. 319.
 Steinheil, H. A. 637.
 Steinitz, E. 784.
 Stenger. 80, 560, 785.
 Stepleanu-Horbatsky, V. 785.
 Sternberg, J. E. 714.
 Sternberg, J. S. 282, 394.
 Stephenson, M. 850.
 Stevens, C. W. 560.
 Stevenson, E. 78.
 Stewart, T. M. 558.
 Stieren, E. 60, 440, 559.
 Stierlin. 852.
 Still, G. F. 478.
 Stillson, M. 479.
 Stilwill, H. R. 131, 238, 535, 714, 822, 917.
 Stitzel. 475.
 Stock, W. 913.
 Stockard, C. R. 916.
 Stocker, F. 58, 156.
 Stoppato, U. 785.
 Story, J. B. 319, 606, 640, 716, 786.
 Strader, G. L. 448, 454, 556.
 Stradiotti, G. 918.
 Strange, C. F. 475.
 Straub. 394, 557.
 Strebel, J. 158, 239, 477, 560, 640.
 Strickler, D. A. 375, 451, 556, 557, 558, 560, 619, 785.
 Strohmayer, W. 475, 850.
 Stuckey, E. J. 157, 783.
 Suffa, G. A. 556, 713.
 Sukanuma, S. 638.
 Suker, G. F. 534, 715, 716.
 Sulzer, D. 476.
 Sumner, P. 314.
 Sutton, J. E. 638.
 Swan. 393.
 Sweet, W. M. 824.
 Swift, G. W. 476, 547, 716.
 Sykes, E. M. 556.
 Sym, W. G. 319, 396.
 Szily, A. von. 697, 715, 852.
 Szily, P. von. 392, 907.
 Sztanojevits, L. 784.
 Taeye, K. 913.
 Takagi. 638.
 Takao, J. 638.

- Tanaka, K. 80.
 Teal, F. F. 288, 394.
 Terrien, F. 237, 315, 392, 394, 638, 784, 915.
 Terson, A. 396, 555, 713, 783.
 Teske, H. 394.
 Thibert. 361, 557.
 Thieke, A. 852.
 Thiers. 237.
 Thomas, D. O. 319.
 Thomas, H. G. 239.
 Thompson, A. H. 437, 558.
 Thompson, H. M. 378, 379, 557, 560.
 Thompson, J. H. 638, 886.
 Thompson, J. W. 605, 785.
 Thompson, T. 558.
 Thomsen, H. 78.
 Thomsom. 393.
 Thomson, E. 160.
 Thomson, E. S. 556.
 Timme, W. 558.
 Tindall, P. A. 479.
 Titterington, M. B. 785.
 Tixier. 475.
 Tobbler, Th. 918.
 Tobias. 319.
 Todd, H. C. 916.
 Tomlin, H. 157.
 Tomomazu, Y. 640.
 Tooke, F. T. 649, 853.
 Torres-Estrado, A. 159, 850, 851.
 Török, E. 851.
 Toulant. 784.
 Toussy, S. 79.
 Trantas, A. 237, 479, 850, 918.
 Trebilcock, F. C. 240.
 Trerotoli, G. 849.
 Tresling, J. H. A. T. 915.
 Treutler, B. 911, 916.
 Tricoire, R. 477, 784.
 Triebenstein, O. 316.
 Trombetta, E. 475.
 Tscherning, M. 713.
 Tubby, A. H. 319.
 Tuberville, D. 477.
 Turner, H. H. 441, 556.
 Turner, W. E. S. 475.
 Tuto, R. 317.
 Tydings, O. 853.
 Tyndall, E. P. T. 914.
 Tyrrell, E. J. 79.
 Uddgren, G. 475.
 Uhlenhuth, E. 784.
 Uhthoff, W. 314, 912, 916.
 Underwood, H. L. 558.
 Urbantschitsch, E. 784.
 Uren, C. T. 170.
 Uribe-Troncoso, M. 69, 160, 618, 851.
 Urria, M. 149, 314, 395, 477, 850, 913.
 Usher, C. H. 607, 783.
 Vacher, L. 317.
 Vail, D. T. 395, 714.
 Valle, D. 79.
 Valois, L. 475.
 Vandegrift, G. W. 713, 849.
 Van den Felden. 392.
 Van Duyse. 79, 160, 239, 315, 320, 336, 559, 786.
 Van Duyse, D. 366, 394, 478, 558, 559, 916.
 Van Duyse, G. M. 79, 239.
 Van Hoog, E. G. 915.
 Vanhoutte. 637.
 Vankirk, V. E. 61, 157.
 Van Lint. 156, 237, 316, 317, 361, 367, 394, 475, 558, 559, 638.
 Veach, O. L. 92, 238.
 Veasey, C. A. 51, 77, 113, 158, 240.
 Veis. 639.
 Velard, H. E. 318.
 Velasco, J. 917.
 Velez, D. M. 849, 851, 852.
 Velhagen. 917.
 Velter, E. 237, 314, 315, 393.
 Verger. 479.
 Vergnet. 475.
 Verhoeff, F. H. 157, 240, 471.
 Verwey, A. 640.
 Verzar, F. 913.
 Vierling. 916.
 Vigano, E. 911.
 Vigouroux, V. 560.
 Villard, H. 559, 639, 852, 913.
 Villegas, A. 558.
 Vincent, C. 784, 786.
 Vinsonneau. 319, 785, 853.
 Viterbi, A. 156, 556.
 Viusa, S. 716.
 Vogel. 918.
 Vogt, A. 58, 157, 159, 238, 316, 319, 392, 476, 479, 713, 714, 851, 911, 914, 915, 918.
 Von der Heydt, R. 447, 558, 618, 755, 782, 912.
 Waardenburg, P. J. 850.
 Wachs, H. 479.
 Waele, H. de. 476, 783.
 Wahrer, F. L. 818, 917.
 Walker, C. C. 714.
 Walker, C. E. 452, 557, 714.
 Walker, S. 530, 716.
 Wallace, F. E. 67, 159.
 Walter, W. 201, 315.
 Watanabe. 556, 637, 913.
 Watari, S. 637.
 Waterson. 480.
 Watkins, S. S. 915.
 Watkins, W. W. 80.
 Watson, J. B. 785.
 Watts, S. H. 639.
 Wätzold. 237.
 Webber, R. 852.
 Webster, J. H. D. 319.
 Weekers, L. 162, 237, 238, 314, 315, 316, 362, 476, 560, 783, 851.
 Weeks, J. E. 476, 479, 557, 559, 784.
 Weidler, W. B. 240.
 Weigelin. 916.
 Weill. 298, 472.
 Weisser, E. A. 61, 158.
 Wells, D. W. 78, 153, 237.
 Welton, C. B. 79.
 Werner, H. 315.
 Werner, L. 240, 315, 316, 317, 318, 640.
 Wernicke, O. 157.
 Wertheim Salomonson, J. K. A. 477.
 Wescott, C. D. 159.
 Weskamp, C. 917.
 Wessely, K. 157, 158, 159, 477, 783.
 West, L. N. 555.
 Westman, C. 396.

- Westphal, A. 850.
 Wetzel, R. 914.
 Weve, H. 158, 315, 916.
 Wheeler, J. M. 239, 251, 394, 916.
 Whitaker, J. 480, 911.
 White, E. H. 237.
 White, J. W. 556.
 White, L. E. 239, 560.
 Whitehead, A. L. 319.
 Whitham, L. B. 479.
 Whitmire, A. 715.
 Whitmore, H. W. 913.
 Whitwell, A. 555.
 Wiart. 315.
 Wibaut, F. 314.
 Wible, E. E. 61, 157.
 Wieden, E. 78, 559, 783.
 Wiegmann, E. 638, 915.
 Wien, W. 480.
 Wiener, M. 240, 393, 457, 852, 892.
 Wiesner, D. H. 714.
 Wilbrand, H. 784.
 Wilder, W. H. 475, 534, 716.
 Wilkinson, O. 435, 557.
 Williams, T. A. 715.
 Wilmer, W. H. 396, 480, 828, 850.
 Wilson, J. W. 80.
 Wimmer, F. E. J. 476.
 Winfield, M. 317.
 Wise, W. D. 78.
 Wise, W. W. 315.
 Wisselink, G. W. 913.
 Wissmann. 852.
 Wodak, E. 850.
 Wolf, G. D. 479.
 Wolfe, O. 818, 917.
 Wolff, C. K. 315.
 Wolff, L. K. 238, 917.
 Wolflein, E. 316.
 Wolflin, E. 396, 915.
 Wood, C. A. 302, 560, 708, 854, 918.
 Wood, D. J. 849, 851, 853.
 Woodland, E. E. 475.
 Woodruff, F. E. 392, 560.
 Woodruff, H. W. 611, 739, 785, 886, 890, 891, 914.
 Woods, H. 77, 80, 136, 237.
 Woog, P. 158.
 Wright, C. D. 558.
 Wright, W. W. 237.
 Wunderlich, G. 915.
 Würdemann, H. V. 1, 80, 153, 158, 210, 240, 300, 318, 321, 387, 475, 480,, 513, 551, 715, 756, 874, 906, 913.
 Yerkes, R. M. 785.
 Yokomazu, K. 639.
 Yoshida, Y. 493, 638, 714.
 Young, G. 316.
 Young, H. B. 72, 160.
 Young, W. J. 396.
 Zade. 317.
 Zaniboni. 639.
 Zapatero-Vicente, P. 238.
 Zeemann, W. P. C. 770, 784, 915.
 Zeisler. 915.
 Zentmayer, W. 62, 78, 156, 158, 296, 478, 653, 766, 824, 851, 912, 916.
 Zethelius, M. 394, 477.
 Ziegler, S. L. 280, 315, 381, 394, 560, 825, 826, 912, 914.
 Ziemssen. 638.
 Zilva, S. S. 478.
 Zimmermann, C. 907, 908.
 Zimmermann, W. 319, 395.
 Zoja, L. 918.
 Zorn, B. 639.
 Zotzdziowski. 316.
 Zsako, S. 157.
 Zur Nedden. 479, 911.

SUBJECT INDEX

A number in heavy face type gives the page of an original article, including transactions, editorials and correspondence. Numbers in (brackets) refer to abstracts, including those given in society proceedings. Other numbers indicate incidental mention of a subject as in the titles given in Ophthalmic Literature. Names are indexed separately. See p. v.

- Abasia and hysteric blindness, 784.
- Abducens paralysis, (378), 467, 912.
and choked disc, 784.
- Aberration, 157.
- Abiotrophy, 316.
- Abscess, brain, 852.
fixation, 157, 237.
of lids, 639.
of orbit, 395, 876, 917.
of sclera, 78.
- Absorption of lens, (767).
- Abstracts, 67, 146, 226, 298, 383, 460, 538,
621, 694, 768, 835.
- Accommodation, 77, 392, 474, 555, 637, 713,
918.
and convergence, (298), (407).
paralysis of in encephalitis, 849.
after lightning stroke, 849.
physiology of in birds, 798.
- Acetonuria, 676.
- Acriflavin, 78.
- Acromegaly, 319, (534).
- Actinomycosis 80, 327, 637, 638, 715.
- Adaptation, 158, 638, 639, 715, 784, 849, 915.
- Adduction, 878.
- Adenocylindroma, 716.
- Adolescence, ocular hemorrhage in, 640, 652,
657, 851.
- Adrenalin, 238, (835).
- Advancement, 237, 314, 393, (457), 755.
- After cataract, 157, 238, 280, (289),
images, 79, 316.
- Age and refraction, 228.
- Airol, 913.
- Alcohol, 315.
- Alexia, 477, 588, 639, 784.
See also Word blindness.
- Alkaloids, action on iris, 783, (835).
- Alt, Adolf, 626.
- Amaurosis, see Blindness.
- Amaurotic idiocy, 239, 316, 851.
- Amblyopia after injury, 318.
hysteric, 159, (288).
simulated, 237.
See also Toxic amblyopias.
- American Academy of Ophthalmology and
Oto-Laryngology, 454, (469).
- American Journal of Ophthalmology, 68,
905.
- American Ophthalmological Society, (285),
(470).
- Ametropia, (149), 782.
and convex lenses, 637.
- Amphitheatre for ophthalmic surgery, 314.
- Anaphylaxis, 640, 851.
- Anatomy, ocular, 480, 850, 853.
- Anemia, pernicious, 316.
- Anesthetics, 852.
local, 238, 299, (362), 558, 747, 782, 849.
subconjunctival, 713.
- Aneurysm of cavernous sinus, 144, 239, 478.
of orbit, 79, 239.
of retina, 641.
of temporal artery, (534), (538).
- Angiomatosis, 915.
- Angioma of choroid, 785.
- Aniridia, (515), 714.
- Anisometropia, 392.
- Anomalies, 239, 477.
of canthus, (688).
of color sense, 158.
of fundus, 161, (217).
of iris, 475.
of lid, 852.
of muscles, 521, 556.
of optic nerve, 158.
of pupil, 850.
of refraction, 237.
- Anomaloscope, 911, 916.
- Anophthalmia, 852.
- Anterior chamber, 78, 157, 238, 315, 475, 556,
637, 714, 783, 836, 850, 914.
changes in, 637.
cilia in, 128, 138.
copper wire in, (377).
hemolysin in, 638.
microscopy of, 637, 911.
- Anterior segment, injury to, 785.
- Antigens, 475.
- Aphakia, operative, (620).
- Aphykia retinae, 109, 306.
- Apoplexy, corneal, 157, 913.
- Appendicitis, 850.
- Aqueous humor, 157, 914.
and Wassermann, 315.
composition of, 556.
viscosity of, 157.
- Arcus juvenilis, 783.
senilis, (839).
- Argyll-Robertson pupil, (147).
- Argyrosis, 836.
- Armamentarium, oculist's, (363).
- Army of occupation, ophthalmic service in,
343, 427.
- Arsenic, and retinal disease, 317, 915.
- Arsenicomercury, 715.
- Arsenobenzol, 237, 783, 853.
- Arsphenamin, 477, see salvarsan.
- Arteriosclerosis, 159, 392, (538), 674, 716.
- Artery, occlusion of central retinal, 48.
- Artificial eyes, 160, 394, 395, 487, (612), 916.
light, 80, 239.
pupil, 315.
- Asphyxiating gas, 321, 395, 475, 478, 583,
715.
- Aspirin, 78.
- Asthenopia, 77, (297), 356, (841).
- Asthma, 853.

- Astigmatism, 77, (149), 157, 314, 392, (455), (516), 713, 782, 911, 912.
 and myopia, 155, 713.
 axis of, (222).
 changes in, 228, 392.
 Autopsy in ophthalmoplegia, 849.
 Ataxia, 319.
 ocular, 555.
 Atresia of lacrimal duct, 406.
 Atrophy of choroid, 157, 476, 639, (828).
 of iris, 837.
 of optic nerve, 477, 558, 639, 915.
 of retina, 157.
 Atropin, 157, 474, (835).
 intoxication after, 392.
 test, 237.
 Autoplasty, 79, 559, (625).
 Aviation, 237, 258, 314, 319, 320, 396, 480, 555.
 and visual fields, 80.
 effect of nose and throat upon ocular function in, 170.
 Avulsion of optic nerve, (54), (62), 558, 917.
 Axis finder, 359.
 in astigmatism, (222), 912.

 Bacillus capsulatus, 477.
 Bacterial toxins and healing of wounds, 319, (462).
 Bacteriotherapy and chemotherapy, 392, 913.
 Baltimore Ophthalmological Society, 136, 224.
 Bandages, 392, 713.
 Barbitol poisoning, 783.
 Barium sulphat, 851.
 Barraquer's operation, (366), 714, 721, 723, (770), 851.
 Basedow's disease, 77, 639.
 Bees, 158, 396.
 Belat-Fraudet method of localization, 319.
 Belgian Army, ophthalmic service in, 427.
 Ophthalmological Society, 361, 471.
 Bernard-Horner syndrome, 158, 237, 396.
 Binocular vision, 237, 315, 555, 705, 849, 851, 916.
 Biographic sketches, 307, 631, 778.
 Biography, 80, 160, 240, 320, 396, 480, 640, 716, 786, 846, 854.
 Birds' eyes, 240, 560, 716.
 color of, 479.
 double fovea in, 784.
 physiology of accommodation in, 798.
 Blastomyces albicans, 79.
 Blennorrhagic ophthalmia, 78, 913.
 Blepharitis, 318.
 Blepharoplasty, 79, 318.
 Blepharoptosis, See ptosis.
 Blepharospasm, 715.
 Blind, 786.
 Binet scale for, 320, 480, 560.
 care of, 80, 396, 479, 640, 785.
 education of, 480, 786.
 members of committee, 479.
 pensions for, 480.
 sight of the, 784.
 what it is like to be, (551).
 Blindness, 394, 560, 640, 916.
 bilateral, 782, 849.
 causes of, 637, 854.
 congenital, 316.
 epidemic of, 479.
 hereditary and marriage, 240.
 hysteric, 394, 477, 784, 852, 916.
 mind, 317.
 posthemorrhagic, 239.
 prevention of, 76, 396, 560, 636.
 psychic, 51, (227), (522).
 transitory, 158, 317, 915.
 unilateral, 511.
 Blind spot, 715, 911, 912, 915.
 Blood, circulation of, 157, 316, 716.
 pressure, 316, 676.
 staining of cornea, 564, 783.
 Blue scleras, 78, (821).
 Book Notices—
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 Igersheimer, J., Syphilis and the Eye, 466.
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 Lewis, B., Vademecum for Otolologists, 389.
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 — American Ophthalmological Society, 1919, 470.
 — College of Physicians of Philadelphia, 1918, 471.
 — Heidelberg Ophthalmological Society, 1916, 906.

- Ophthalmic Section, Department of Public Health, Egypt, 1917, 233; 710.
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- Pacific Coast Oto-Ophthalmological Society, 1919, 233.
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- Botulism, 396, 560, 919.
- Brain tumor, 79, 239, 394, 477, 638, 736, 852. simulated, (458).
- Brisseau, Michael, 786.
- British Ophthalmologists, Council of, 155.
- Brossage, 393.
- Buphthalmos, 140, 474.
- Burns, 132, 158, (293), 393. from salt of copper, 208. of conjunctiva, 256, 395. sulphuric acid, (822).
- Cacodylat of soda, 237.
- Calcium carbid, (226).
- Calmette reaction, 395.
- Canaliculus restoration of, 883.
- Cancer, treatment of, 159.
- Cantharidin, 237.
- Canthotomy, 685.
- Canthus anomaly, 852. nevus of, (441).
- Capsular extractions, 78, 282, 316, 476, (552), 714, 726, 774, 851.
- Capsule in cataract extraction, (212), (214). of Tenon, tumor of, 210.
- Capsulotomy, 78, 284, 851.
- Carbon dioxide snow, 157.
- Carcinoma of choroid, 716. of lids, 159. of orbit, 332.
- Carotid, ligation of, 239, 318, (624), 852, 915.
- Cartilage of plica, 637.
- Case records, 629.
- Cataract, absorption of (767). and glaucoma, 316, 561. and myotonic dystrophy, 157. and pregnancy, 851. and syphilis, 394. black, (60), 157, 238, 316. blue dotted, (515). congenital, 78, 238, 277, 476, (758), 914, 918. diabetic, 393, 783. experimental, (58). family, 393, 783. improvement in unoperated, 820, (896). iridotomy in immature, (515). lamellar, 476. morgagnian, (529), 851. polar, 453. radium in, 643. secondary, 157, 238, 280, (289), 825. senile, 178, 316, 394, 476, 638, 739, 785, 851. soft, 557. stellate, (225). traumatic, 78, 393, 435, 476, (546), 557, 638. treatment of, 158, 316, 643, 851. zonular, 783.
- Cataract extraction, 78, (212), (214), 238, 282, (298), 316, (374), 386, 393, 394, 476, 546, 561, 538, 714, 721, 726, 739, 741, (774), 783, 786, 820, 851, 902, 914. and hemorrhage, 23. anesthesia in, 238. delirium, 741, (889), 902. elevation of conjunctiva previous to, 714, 715. fixation of globe in, 476. infection after, (609). intracapsular, 78, 282, 316, 476, (552), 714, 774, 851. of traumatic cataract, (546). paralysis of lids in, 476. safety procedures in, 739, (886). subconjunctival, 275. suture of cornea in, 316. with lance knife, (289).
- Cauterization of tear sac, 239, 317.
- Cavernous sinus, 79. aneurysm of, 144.
- Cellulitis, (447).
- Cereal grains, 6.
- Cerebrospinal fever, 237, 319.
- Certificate in ophthalmology, 74.
- Cervical sympathetic, 316, 396, (454). extirpation of and iris, 783, (835).
- Chalazion and refraction, 394.
- Chemotherapy, 392.
- Chiasm, alterations in, 79.
- Chicago Ophthalmological Society, 138, 368. 442, 530, 611.
- Chloral, action of on pupil, 850.
- Chloraton paraffin, 475.
- Choked disc, 1, (379), 394, 852, 915.
- Cholesteatoma, 134.
- Chondroepithelioma, (366).
- Choroid, 476, 714. atrophy of, 157, 476, 639, (828). capillary layer of, 638. circulation in, 914. coloboma of, 97. hernia of, 372. ossification of, (535). rupture of, 133. sclerosis of, (297). tubercle of, 393. tuberculosis of, (557).
- Choroiditis, (620). central, 315. disseminated, 476, 714.
- Choroidoretinitis, (53), (62), 317, 557, 714, 715. and communicating vessels, 499.
- Cilia in anterior chamber, 128, 138.
- Ciliary body detachment, 316. epithelium and ectopia, 714. process in ulcer, 315.
- Cinema and eye, 637, (845), 849, 851.
- Clinics, 320, (552).
- Coats' disease, 558.
- Cobalt glass, (516).
- Cocain, 77, 238. poisoning, (527).
- Colchicum, 913.

- Collargol, 392.
 College of Physicians of Philadelphia, 62,
 219, 295, 379, 758, 824.
 Collyria, 474.
 Coloboma of choroid, 97, 316, (380).
 eyeball, 79.
 iris, 97, (380), 476, 838.
 lens, 476.
 lids, 639.
 macula, (296), 316.
 optic nerve, 158, (366), 394.
 sclera, (372), 556.
 Color blindness, 79, 158, 477, (551), 558,
 (845), 852, 854, 916.
 and Hering's apparatus, 317.
 and Young's hypothesis, 715.
 congenital, 79, 477.
 in fish, 784.
 in women, 784.
 matching in, 239.
 perception, 316, 639.
 sense, 158, 557, (772), 812, 852.
 tests, (516), 639, 715, 784.
 vision, 79, 158, 239, 317, 396, 477, 558, 639,
 715, 784, 852.
 Colorado Ophthalmological Society, 66, 130,
 373, 448, 535, 618, 821.
 Commotio oculi, (542).
 Comparative ophthalmology, 159, 396, 479,
 558, 560, 640, 716, 783, 785, 853, 918.
 Compensation for injury, 159, 230, 325, (369),
 (373), 392, 396, (542), 560, 640.
 Concussion, (225), 317, 318.
 Congress, Colorado, 212, (868).
 Heidelberg, 906.
 International, 80, 384, 549.
 Oxford, 473.
 Conical cornea, see Keratoconus.
 Conjunctiva, 77, 157, 238, 315, 393, 475, 556,
 637, 714, 783, 849, 913.
 actinomycosis of, 637.
 burns of, 256.
 chance of, 157.
 gumma of, 238.
 papillary bodies in, 556.
 papilloma of, 637.
 neuroallergica, 714 (840).
 penicilium glaucum in, 556.
 sclerosis, 637.
 staining of, (527).
 tuberculosis of, 206,, 315, 556.
 tumor of, 113, 240, 395, 478, 559, 683, 852.
 Conjunctival coccidium, 637.
 hyperplastic tissue, 402.
 Conjunctivitis, 78, 393, 640, 913.
 blennorrhagic, 78, 913.
 cinema, (845), 849, 851.
 eczematous, 475.
 follicular, 238, 556.
 gonorrhoeal, 157, 315, (454), 475, 556, 637,
 (694), 783, 850, 913.
 granular 157, 393.
 Koch-Weeks, 783.
 Morax-Axenfeld, 315, 783.
 phlyctenular, (61), 157.
 scrofulous, 556, 714, 783, (840).
 self-inflicted, 601, 858.
 sporotrichosis, 393.
 streptococcic, (536).
 swimming bath, 913.
 vaccine, 475.
 vernal, 127, 130, 238, 475, (523), (541),
 556, 637.
 Conservation of vision, 80, (285), 319, 473,
 479, 688.
 classes in, 234.
 Contusion, (527), 716.
 Convergence, (153), 782, 783.
 and accommodation, (289), (470).
 insufficiency of, 269, (454), 878.
 Convex glasses and adaptation, 317.
 Cornea, 78, 157, 238, 315, 475, 556, 637, 714,
 783, 850, 913.
 action of methyl violet on, 637.
 bevel of, 157.
 blood staining of, 564.
 conical, see Keratoconus.
 curvature of, 474.
 degeneration of, (532), 637, 827.
 enlarged in fish, (607).
 fibres in, 850.
 mole on, 818.
 nutrition of, 315.
 papilloma of, 138.
 rupture of, 787.
 sensitiveness of, 556.
 Corneal apoplexy, 157.
 atrophy, 637.
 dystrophy, 783, 850.
 herpes, 78, 158, 475, (540), (619), (687),
 756.
 microscope, 314, 538.
 limbus, (821).
 opacity, 315, 475, 637, (687), 717, 850, 913.
 sclerosis, (541).
 staphyloma, 78, 913.
 staining, 315.
 tuberculosis, 133, 238, 850.
 ulcer, 238, 315, (540), 556, 637, 783, 850,
 913.
 Corneo-scleral, furrow, 315.
 margin, histology of, 78.
 trephining, (146), 238, 316, 557, 638, 914.
 Correspondence, 72, 153, 306, 552, 708.
 Council of British Ophthalmologists, 155.
 Cranial injuries, eye symptoms, 158.
 Crocodile, iris muscle, 783.
 Crossed eyes, see Strabismus.
 Cryptophthalmia, 684.
 Crystalline lens, 78, 157, 238, 316, 393, 476,
 638, 714, 783, 851, 914.
 absorption of, (461), (767).
 clinical study of, (709).
 color changes in, 714.
 discission of, (526).
 dislocation of, 316, 476, (521), 638, 714,
 783, 914.
 form of, 316.
 lamination of, 714.
 luxation of, 316.
 names of, 638.
 nucleus of, 476.
 opacity of, see Cataract.
 regeneration of in amphibiae, 784.
 sheath of, 78.
 weight, volume and ash of, 238.
 Vossius' ring on, 316, 914.
 Cyanid of gold, 237.
 Cyclodialysis, 41, (64), 157, (458), 638
 Cycloplegics, 392, 555, 716, 849.
 Cyclops, 784, 852.

- Cylinders, axis of, 77, (222).
 Cyst, anterior chamber (448).
 cornea, 240, 637.
 iris, 78, 157, 238, 476, (687), 914.
 lacrimal gland, (516), 916.
 lids, 158, 318.
 orbit 80, 318, (440), 478, 917.
 sclera, 637, 914.
 Cysticercus, 159, 395.
 subretinal, 79, 917.
 vitreous, (290), 395.
 Cytologic studies, 918.
- Dacryocystectomy, 317, 477.
 Dacryocystitis, 79, 158, 715, 785, 852, 916.
 rubber drain in, 317, (367).
 chlorid of zinc in, 715.
 Dacryocystorhinostomy, 558, 852.
 Death, fundus after, 321.
 ophthalmoscopic signs of, (322).
- Deaths:
 Alt, A., 635, 778.
 Antonelli, A., 780.
 Arnold, J. D., 307.
 Behrman, M., 235, 390.
 Bjerrum, J., 780.
 Bowles, F. J., 235.
 Breaks, L. Z., 711.
 Callan, L. W., 154, 631.
 Campbell, J. F., 711.
 Chacon, A., 390.
 Church, B. F., 307.
 Connell, E. J., 631.
 Cook, W. D., 847.
 Cowgill, W. M., 154, 307.
 Eperon, S., 847.
 Evershed, R., 390.
 Ferguson, C. D., 780.
 Goux, J. L., 75.
 Hill, H. B., 554, 635.
 Hollister, M. C., 154.
 Holmes, C. R., 154, 307.
 Johnson, J. J., 235.
 Kyle, J. J., 847.
 Lance, A. J., 154.
 Lent, L. H., 154.
 Lewin, W. C., 847.
 Lindsey, E. L., 390.
 Linhart, C. P., 472.
 McIntire, C., 309.
 Marshall, J. P., 472.
 Morse, H. B., 711.
 Montgomery, W. T., 390.
 Musser, F. R., 311.
 Norton, A. B., 311.
 Nuel, J. P., 847.
 Nunn, R., 780.
 Pinckard, C. P., 154.
 Pinkerton, J., 390.
 Pitts, B., 390, 631.
 Randolph, R. L., 75.
 Reyling, F. T., 312, 390, 632.
 Risley, S. D., 390, 632.
 Robin, E. A., 711.
 Rogers, W. K., 312, 390.
 Russell, E. R., 75, 633.
 Shorter, J. M., 235, 634.
 Stowell, H. E., 312.
 Spencer, J. H., 534.
 Steinbach, J., 711.
 Stubbs, G. H., 75.
 Thiede, G. A., 312.
 Valk, Frances, 634.
 Vetsch, U., 847.
 Whitney, E. M., 390.
- Decompression, 477.
 in glaucoma, 316, (363).
 Delirium, 741, (889), 902.
 Dental diseases, 80, 238, (452), 475, 479, 560,
 639, 716, 860, (899), 917.
 Dermatitis exfoliativa, 433.
 Dermoids, 318, (440), 478.
 Detachment of ciliary body, 316.
 of retina, (57), 143, 158, 238, 239, 316, 317,
 394, (437), 477, 558, 639, (696), (697),
 714, 715, 784, 851, 912.
 Deviation, conjugate, 393.
 Diabetes, 474, (609), 720, 912.
 and cataract, 393, 783.
 and exophthalmos, 559.
 Diagnosis, 77, 99, 157, 237, 314, 392, 474, 555.
 637, 713, 782, 842, 849, 911.
 in glaucoma, 732, 783, 842.
 in scientific team work, 160.
 Diathesis and glaucoma, 316.
 Dichlorethylsulphid, 209, 395, (543).
 Dionin, 284.
 Dioptric measurements, 314.
 Diphtheria, 853.
 antitoxin, (536).
 paralysis in, 747.
 Diploma in ophthalmology, 716.
 Diplopia, 157, 237, 392, 555, 713, 912
 binocular, 627.
 homonymous, 77.
 Discission, (825).
 Dislocation of eyeball, 814.
 of lens, 316, 393, 476, (521), 638, 714, 783,
 914.
 Distance, estimation of, (705).
 Drugs, action of on cornea, (540).
 narcotic, 234.
 Drusen of disc, (376).
 Duboisin, 77.
 Dynamics of extrinsic muscles, 878, (892).
 Dynamometer and blood pressure, 316.
 Dysentery, 319, 395.
- Ear and eye, 80, 396, 785, 849, 914.
 nose and throat, relation to eye, 349,
 (369).
 Eclipse scotoma, 915.
 Economics, 80, 159, 240, 320, 396, 434, 479,
 480, 640, 854.
 Ectopia of lens, 714.
 Ectropion, 158, 318, (612).
 dermic graft in, 251.
 Eczema, 159, 913.
- Editorials—
 Academy Meeting, 904.
 Adolf Alt, 626.
 American Board for Ophthalmic Examina-
 tions, 71.
 Base Line for Ocular Measurements, 54.
 Binocular Discrimination of Distance, 765.
 Cataract Operations, 386; 774.
 Change in Refraction with Age, 228.
 Condition of Ophthalmologists Abroad,
 550.
 Examination and Case Records, 629.

- Glaucoma, 704.
 Graded Examinations in Ophthalmology, 776.
 Hole in Macula, 70.
 Hospital Standardization, 547.
 Insanity After Cataract Extraction, 902.
 International Ophthalmological Congress, 384, 549.
 Iris in the Newspapers, 152.
 Methyl Alcohol Poisoning, 150.
 Moorfield's Appeal, 708.
 Moving Picture Ophthalmia, 844.
 National Meetings, 230.
 Neglected Opportunity, 842.
 New Journal, 466.
 New Orleans Meeting, 465.
 Protective Glasses, 707.
 Publication Resumed, 231.
 Reports of Rare Pathologic Conditions, 464.
 Relation of Ophthalmologists to Dispensing Opticians, 300.
 Rights to Collect for Services, 903.
 Special Qualifications in Ophthalmology, 153.
 Study of Binocular Diplopia, 627.
 Study of Local Anesthetics, 299.
 Suspended Journals, 550.
 Tests for Poor Vision, 843.
 The Journal Year, 905.
 Volume Three, 68.
 Waste of Energy in Ophthalmology, 69.
 Which are our Best Papers, 302.
 Education, 80, 160, 240, 320, 396, 473, 480, 560, 640, 716, 786, 854.
 and eyesight, 319, 479.
 in ocular physiology, (625).
 ophthalmic school in India, 480.
 Egyptian Ophthalmological Society, 233, 320.
 Electrolysis, 476.
 Elliot operation, (146), 157, 238, 316, (364), 557, 638.
 Embolism, retinal, 158, (224), 239, 477, 513.
 Emetin, 240, (623), 850.
 Encephalitis lethargica, 80, 159, 237, 240, 319, (373), 395, 475, 479, (530), 560, 587, (619), 637, 640, 716, 784, 785, 849, 853, 912, 918.
 Encyclopedia of ophthalmology, 468.
 Endarteritis, (295).
 Endocrin organs, 394, 853, 918.
 Endophlebitis and retinal hemorrhage, 111.
 Endophthalmometer, 849.
 Endothelioma, 318.
 of lid, 395.
 Endosperm, (835).
 Enucleation, 134, 316, 477, 497, (611), 784, 916.
 method of, 166.
 Epinephrin, 556, 667, 914.
 Epiphora, 477.
 Epistaxis, 474.
 Epithelial dystrophy, (540).
 Epithelioma, 80, 395.
 of conjunctiva, 113, 683.
 of lid, 559, 602.
 of orbit, 559.
 Ergograph, 393.
 Erisiphake, (356), 714, 721, 723, (770), 851.
 Erythema, 850.
 Erythroptosis, 558.
 Eserin, 237, 238, 911.
 Esophoria, 882.
 Ethmoid mucocele of, (383).
 Ethmoiditis, 80.
 Ethylhydrocuprein, 360, 911.
 Eugenics, 479.
 Evisceration, (611).
 Evulsion of optic nerve, 318.
 Examinations, 71, 74, 153, 553, 629, 716, 776.
 Exophoria, 117, 782, 783.
 Exophthalmic goiter, 79, 239, 478, 559, 649, 852, 916, 917.
 Exophthalmos, (62), 79, 395, (535), 559, (624), 639, 852.
 pulsating, 159, 318, (437), 478, 605, 917.
 Eye, artificial, 394, 395, 478, (612).
 color of, 157, 918.
 formation of, 317.
 lash, 239, 640.
 symmetry of, 317, 319.
 Eyeball, 79, 239, 317, 477, 558, 639, 784, 852, 916.
 in injury, 558.
 luxation of, 814, 916.
 ossification of, 239.
 perforation of, 640.
 Eyestrain, 77, 157, 314, 474, 479, 637, (700), 782.
 of artists, 77.
 Facial paralysis, (776), 912.
 Fees, right to collect, 903.
 Fever and ocular complications, 479.
 spotted and optic neuritis, 317.
 Fibrolysin in glaucoma, 851.
 Field of vision, 49, 51, 79, (620), 639, 784.
 in brain tumor, 736.
 in injury, 558.
 in maniacs, 849.
 tubular, 158.
 Field glasses, 713.
 Filaria loa, 79, (146), (617), 917.
 Finsen light therapy, 237.
 Fish, color blindness of, 784.
 enlarged cornea in, (607), 918.
 lengthening of eyeball in, 854.
 Fistula of lid, 158.
 Flap, conjunctival, 393.
 Flavin, 849.
 Flies and trachoma, 393.
 Flounder, migration of eye in, 479.
 Fluorescent rays, 911.
 Focal infection, 33, 80, 157, 159, (226), 238, 315, 476, (828), 850, 860.
 Folliculosis, 913.
 Foreign bodies, 80, 159, 240, 325, 395, (440), 479, 639, 640, 648, 716, 785, 853, 917.
 localization of, 72, 80, 159, 240, 318, 319, (703), 716, 785, 853.
 magnetic, (291), 395, 478, 559.
 removal of, 118, 137, 318, 319, 325, 395, 559, 560, 640, 716, (823), 917.
 Fornicoplasty, 395.
 Fovea of birds, 240.
 Foveal vision, 784.
 Fox, H. A., 232.
 Fracture of skull, 79.
 Fragilitas ossium, 78, 315, (821).

- Fundus anomalies**, 161, (217).
 after death, 321.
 and general disease, 555, (777).
 before death, 477.
 photography of, 77.
Fungus in canaliculi, 239, 327.
Furuncle, lacrimal, 852.
Fusion, 713.

Gas, asphyxiating, 323, 395, 475, 478, 583, 715.
 mantles, 24.
Gasserian ganglion, 315.
General diseases, 80, 159, 240, 319, 395, 479, 555, 560, 640, 716, 785, 853, 918.
 practitioner and ophthalmology, 80, 160, 238, 480.
Genital organs and eye, (840).
Gerontoxon, (542), 783.
Glasses, see Lenses.
Glaucoma, 78, 157, 238, 316, 393, (448), (453), (460), 476, (515), 557, 638, 678, 704, 714, (769), 783, 850, 914.
 and cataract, 316, 561.
 and detachment of retina, 714.
 and myopia, 393, 851.
 and syphilis, 476.
 aniridia in, 714.
 chronic, 238, (363), 816, 851, 914.
 congestive, (444).
 cyclodialysis in, 41, (64), 157.
 etiology of, 673, 851.
 diagnosis of, 732, 783, 842.
 following homatropin, (367).
 inflammatory, 393.
 iodin in, 341.
 juvenile, 140, 474, 557.
 nonoperative treatment of, (608).
 operations, 78, 157, 393, 476, 557, (624), 638, 851, 914.
 secondary, 638.
 simplex, (535).
 thermophore studies in, 914.
 tonometry in, 237, 474, 476, 557, 669.
 traumatic, 361.
Glioma of ciliary processes, 395.
 retinal, 318, 395, 716, 806, 869, 852, 917.
Gliosis and meningoencephalocele, 478.
Glycosuria, 393.
Goggles, 479.
Goiter, 79, 239, 478, 559, 649, 852.
Gonorrhea, (61), 157, 315, (454), 475, 556, 637, (694), 783, 850, 913.
Goundou in Mexico 853.
Gradenigo syndrome, 237, 912.
Grafts, 158, 256, 394, 475, 637, 916.
 dermic for ectropion, 251.
 mucous, (293).
Granuloma, 159.
 Meibomian, (373).
 of iris, 135.
Grippe, 157, 317, 395, 785.
 orbital inflammation in, 785.
 See also Influenza.
Gullstrand lamp, 237, (365), 555, 556, 714, 782, (835).
Gumma, 238, 853, 914.
Head surgery, (285), 640.
Headache, 159, 237, 314, 637, 782.

Heat therapy, 77, 238, 314, 783.
Hematoma, 240.
Hemeralopia, 162, 477, 558, 715, 784, 851, 915.
 after optochin, 158.
 false, 158, 239.
Hemianopsia, 51, 317, 477, 574.
 after brain injury, 852.
 homonymous, 158, 317, 477.
Hemiplegia, 849.
Hemiatrophy of face, (362).
Hemicrania, 80.
Hemorrhage and blindness, 158.
 and venesection, 23.
 retinal, 78, 111, 477, 558, (624), 652, 657, 851.
 vitreous, (224), 238, 640.
Heredity, 157, 159, 238, 241, 319, 394, 395, 477, 478, 479, 560, 639, 850, 918.
 and cataract, 393, 783, 918.
 and pigmentation of lids, 874.
Hernia of choroid, (372).
 of vitreous, 914, 915.
Herpes zoster, 78, 158, 475, (540), (619), (687), 756, 913.
 experimental, 716, (769), 850.
Heterochromia, 556, 557, 838, 850, 874.
Heterophthalmia, 238.
Heterophoria, 157, 201, (517), 556, 713, 782.
 and sighting eye, 258.
Heteroplasty, 79.
 orbital, 478.
Heterotropia, 201.
 See Strabismus.
Hetol, 78.
High frequency current, 314.
Histology of conjunctiva, 238.
 of senile eye, (839).
History, 80, 135, 160, 240, 320, 396, 560, 640, 786, 854.
Hole in macula, 70, 133, (224), 477, 558, 605, 884.
Homatropin and glaucoma, (367).
 poison, (823).
Hospitals, eye work in, 240, 479, 854.
 for blind, 320.
 Royal London (Moorfields), 708, (781).
 Scottish, 480.
 standardization of, 547.
Hutchinson teeth, 315.
Hyaloid artery, (534), 557, 715.
 canal, 316, 474.
 membrane, 280.
 vessels, (377).
Hydatid cyst of brain, 158.
Hydrophthalmos, 238, 557, 838.
Hygiene, 80, 159, 240, 319, 396, 473, 479, 560, 716, 785, 854.
Hyperkeratosis, 478.
Hyperopia, (620), 713, 782.
 and diabetes, 474.
Hyperphoria, 882.
Hypertony, 639.
Hypophysis and pupil, 315.
Hypophysis, 158, 239, 558, 784, 852, 916.
Hypotony, 87, (219).
Hysteria, (61), 237, 477, 784, 850.

Idiocy, amaurotic, 239, 316, 477.
Illiterate, test type for, 5.

- Illumination, 24, 80, 237, 392, 555, (621), 716, (770), (772), 849, 911.
 artificial, 80, 716.
 low and visual acuity, 335.
 of mines and nystagmus, 392.
 scale of, 408.
- Implantation, fat, (620).
 gold ball, (824).
 paraffin, (613).
- Industrial injuries, 80, (226), 325, 434, 480, (542), 560.
- Infection after cataract extraction, (609).
 after trephining, 316.
 bacillus subtilis, 393.
 eye as portal of, 238.
 focal, 33, 80, 157, 159, (226), 238, 315, 476, (828), 850, 860.
- Inferior oblique, spasm of, (59).
- Influenza, 80, 157, 476, 784, 785, 849, 853, 855.
 and retinal hemorrhage, 78.
 and thrombosis of vein, 855.
- Injections, iodine, 158.
 milk, (58), 77, 157, 474, 849, 911.
 See parenteral.
 subconjunctival, 237, 475, 637, 884.
- Injuries, 80, 159, 240, 318, 393, 395, (449), 478, 558, 559, 640, 716, 785, 852, 917.
 concussion, (225), 317, 318.
 contusion, (225), 317, 318.
 gas, 323, 395, 475, 478, 583, 715, 917.
 from acids, (822).
 from arrow, 480.
 from bean shooter, (378).
 from cilia, 128, 138.
 from chestnut burr, (366), 479.
 from copper, (377), 478, 479.
 from explosion, 395, (538).
 from fork, 318, 640, (768).
 from glass, 716.
 from ink, 159.
 from light, 178.
 from lime, 80.
 from nail, (67), 479.
 from nickel splinter, 319.
 from salt of copper, 208.
 from steel, 137, 478, (821).
 from tennis ball, (224).
 from wood, 559.
 from X-ray, 240.
 indirect, 640.
 industrial, 80, (226), 325, 434, 480, (542), 560.
 penetrating, 132, 159, (451), 478, 560, (703), 716.
 perforating, 159, (516), 559, 716.
 self-inflicted, 237, 392, 601, 858.
 to centers, 51, 317.
 to choroid, 133, 318, 559, 640.
 to ciliary body, 395, 478, 805.
 to conjunctiva, 395.
 to cornea, 80, 318, (366), 395, 478, 559, 640, 787.
 to eyeball, (66), 814, 853.
 to iris, 853.
 to lens, 478, 479, 559, (821).
 to lids, 478, 917.
 to muscles, 361.
 to optic nerve, (53), 317, 318, 559.
 to orbit, 362, 478, 559.
 to pupil, (378), 650.
 to retina, 318, 478, 559.
 to sclera, (62), (67), 240, 318, 805.
 to trochlea, 80.
 to vitreous, (291), 395, 559.
- Insanity after cataract extraction, 902.
- Instruments, 237, 314, 359, (381), 755, 911.
 dioptric, 314.
 optical, 637.
- Intoxication, gastric, 77.
- Intracapsular extraction, see cataract extraction.
- Intraocular pressure, 157.
- Intracranial lesions, 555.
- Iodin, 158, 237, 315, 637, 849.
 in glaucoma, 341.
- Iontophoresis, 474.
- Iridectomy, 78, 238, (618).
 for glaucoma, (453), 638, 914.
- Iridochoroiditis, 476, 638, 639, 715.
- Iridocyclitis, 316, (377), (379).
- Iridodialysis, 357, 716, 850.
- Iridodonesis, (453).
- Iridoplegia, 748.
- Iridotomy, 392, (515).
- Iris, (151), 714, 783, 914.
 anatomy of, 850.
 changes in, 493.
 coloboma of, 97, 850.
 colorless, 476.
 cyst of, 78.
 depigmentation, 78, 238.
 granuloma of, 135.
 muscle, 783.
 of dog, 557, 783.
 neoplastic degeneration of, (827).
 new formed vessels in, (437).
 prolapse of, (516), 716.
- Iritis, 315, 316, 393, (452), 476, 556, 557, 714, 783, (885), 914.
 glaucomatous, 157, 393, (448), (618).
 gonorrheal, (438).
 recurrent, (66), 432, (618).
 rheumatic, 315.
 syphilitic, 78, 157, 315.
 treatment with protein, 93.
- Irrigation, 316.
- Itrol, 475.
- Jaundice, 474.
- Journal of Physiologic Optics, (466).
- Juvenile cataract, 78, 238, 277, 476, (758).
 glaucoma, 140, 474, 557.
- Kaposi's disease, 318.
- Keratalgia, (542).
- Keratitis, 78, 143, 238, 393, 475, (539), 637, 714, 850, 913.
 alphabet, 913.
 disciformis, 475, (542).
 dumbell, 157.
 eczematous, 159, 913.
 from wasp sting, 493.
 furrow, (688).
 harvesters', 315.
 hypopyon, (65), 78, 157.
 interstitial, see parenchymatous.
 macular, 157.
 neuromyolytic, 238, 354, 850, 913.
 nodular, 315.
 parenchymatous, 78, 315, 475, (541), 637, (701), 783, 913.
 peripheral, (528).

- phlyctenular, 315, (540), 850.
 profunda, 556.
 punctate, (688).
 reticular, 717.
 sclerotic, 913.
 scrofulous, 556.
 tuberculous, 850.
 Keratoconjunctivitis, 209, (540).
 Keratoconus, 315, 393, 475, 637, 913.
 and vernal conjunctivitis, 127.
 operation for, 429, (459).
 Keratoiritis, (374).
 Keratomalacia, 78.
 Keratoplasty, 475.
 Knife, cataract, 713.
 Krönlein operation, 639, 789, 852.
- Labyrinth, 77, 314, 784.
 Lacrimal apparatus, 79, 158, 239, 317, 394,
 477, 558, 639, 715, 785, 852, 916.
 canaliculi 239, 317, 916.
 duct, atresia of, 406.
 furuncle, 639.
 gland, and carcinoma, 332.
 secretion, 393, 802.
 Lacrimal sac, 79, 317, 639, 852, 916.
 compression muscle of, 785.
 draining of, (219).
 excision of, (221).
 extirpation of, 239, 477, 559, 715.
 fistula of, (697).
 incision of, 206.
 lupus of, 852.
 Lactic acid in vitreous, 78.
 Lagophthalmos, 158, (542).
 Lamp, Gullstrand, 237, (365).
 Lance knife, (298).
 Lantern, color sense, 916.
 for testing light sense, 335.
 Larva, 477.
 Lead poisoning, (886).
 Leber's disease, 915.
 Lenses, bifocal cataract, 912.
 colored, 785.
 decentering of, 912.
 history of, 786.
 punctal, 782.
 protective, 159, 396, 688, (707), 716, 785.
 sun, 716.
 toric, 686.
 Lenticonus, 239.
 Leptothrix on conjunctiva, 913.
 Lethargic encephalitis, See Encephalitis.
 Leucoma, 475.
 Leucosis retinae, 109, 306.
 Lids, 79, 158, 239, 318, 394, 478, 559, 639,
 715, 785, 852, 916.
 and ear reflex 785, 852.
 coloboma of, 639.
 edema of, 916.
 horn of, (688), 852.
 fistula of, 158.
 operations on, 79, 158, 318, 394, (463),
 559, 639, 715, 785, 852.
 ulcer of, (377).
 vaccination of, 103.
 Liebreich's ophthalmoscope, (135).
 Light, composition of, 24.
 therapy, 911.
- Lime and eczema, 159.
 Lipoma, 395.
 Little's disease, 560, 918.
 Liver and astigmatism, (455).
 Localization, of foreign bodies, 72, 80, 159,
 240, 318, 319, 716, 785, 853.
 of images, 715, 912.
 Locomotor ataxia, 159.
 Lues, 240, 319, 477, 479, 638, 918.
 Lumbar puncture, 394.
 Lupus of lacrimal sac, 852.
 Luxation of eyeball, 319, 814.
 of lens, 316, 476, (521), 638, 714, 783.
 Lymphadenoma, 640.
 Lymphoma, 395.
 Lymphosarcoma, 210.
- Macrolentis, 675.
 Macula changes in, (54).
 degeneration of, 178, 241, 558, 915,
 hole in, 70, 133, (224), 477, 558, 605, 884.
 Maddox rod, 555, 556.
 Magnet extraction, (823).
 Malaria, 479, 849.
 Maniacs, 849.
 Marriage and hereditary blindness, 240.
 Massage in embolism, 513.
 Masseurs, 319, 320, 396, 480.
 Mastoid disease, 394.
 Measles, 316.
 Medico-legal, 80, 786, 805, 854.
 Meibomian glands, 849.
 Megalocornea, 238, 556, (608), 783.
 Melanoma, 872.
 Melanosarcoma, 478, 836.
 Meningitis, 79, 555, 915, 917.
 Mercurochrome, 220, 475.
 Mercurophen, (765).
 Mesopotamia eye work in, 240.
 Metabolism, and glaucoma, 677.
 Metastatic ophthalmia, 475, 852, 913.
 Methylen blue, 911.
 Methyl violet, 637.
 Microcornea, (608), 675.
 Microphthalmos, 79.
 Microscope, corneal, 314, 637.
 Microscopic examination, 395, 637.
 of living eye, (538), (835), 911.
 in endophlebitis, 111.
 of orbital abscess, 876.
 Middlemore, R., 240.
 Migrain, 782, 852, 912.
 Mikulicz' disease, 559, (624), 639, 785, 852,
 916.
 Military service, (885).
 Miotics, and glaucoma, 557.
 Mnemonics, 77.
 Mole, pigmented of cornea, 818.
 Mongolian idiocy, 394, 639.
 Moorfields Eye Hospital, 708, (781).
 Motor drivers, one eyed, 786.
 vision of, 157.
 Mucocoele, (383), 395, 478.
 Muscular balance, 77, 136, 878, (892).
 Myasthenia, 79, 747.
 Mydriasis, 238, 556, 716, (823), 911, 914.

- Myopia, 314, 474, 637, 713, 912.
and dissection of lens, (526).
etiology of, 314.
high, 237, 849, 850, 851.
progressive, 129, 555.
school, 80.
- Myotonia dystrophy, 157.
- Naphthol camphor oxid, 238, (623).
- Nasal disease, 170, 195, 232, 319, 395, 560.
- Nela research laboratories, 712.
- Nernst lamp, 316, 911.
- Nervous disease and the eye, 240, 640.
- Neuralgia, 560, 918.
- Neurasthenia, (620), 782.
- Neurobiotaxis, 79.
- Neuroblastoma, 318.
- Neurofibromatosis, (686).
- Neuroretinitis, 317.
syphilitic, 1, 131, 915.
- Neuroses, 556.
- Nevus, (441).
- News items, 75, 154, 235, 312, 391, 472, 554,
635, 780, 847, 909.
- Nocardiasis, 478.
- Novarsenobenzol, 638.
- Nutrition, and eye disease, 716, 784.
- Nystagmus, 77, 157, (515), (620), 637, 849,
912.
and twilight vision, 162.
caloric, 314.
cerebral, 555, 912.
latent, 555.
miners', 237, 315, (368), 392, 393, 475, 556,
854, 912.
occupational, 237, 396.
- Occlusion monocular, 393.
of artery, (295).
- Ocular movements, 77, (148), 157, 237, 314,
392, 475, 555, 637, 713, 782, 849, 912.
and attention, 77.
- Ocular muscles, imbalance of, 136, 237, 878.
operations on, 116.
- Ocular measurements, 484.
physiology, institute for, (625).
- Oculocardiac reflex, 319, 479, 638, 785, 849,
853, 918.
- Ointment, Singleton's, 157.
- Operations, 77, 157, 314, 392, 474, 636, 637,
713, 782, 849, 906, 911.
and delirium, 741.
glaucoma, 78, 157, 393, 476, 557, (624), 638,
851.
Krönlein, 639, 789, 852.
lacrimal, 239, 477, 559, 715.
lids, 79, 251, 715.
muscles, 116, 237, 314, 393, (457), 755.
orbit, 144, 239, 318, 559.
plastic, 55, 79, 239, 318, 478, (612), 785.
socket, 55, 555.
Toti's, 477.
Zeeman's, 916.
- Ophthalmia, electric, (226).
gonorrheal, (61), (475).
metastatic, (475), 852.
neonatorum, 78, 140, 315, 475, (610), (781).
moving pictures, (637), 845.
phlyctenular, (61).
- Ophthalmic education, 121, 240, 302, 640, 716.
examinations, 71, 74, 153, 553, 716, 776.
- journals, suspension of, 550, 554.
physicians, (55), (144), 240, (294).
qualifications, (151).
service in army of occupation, 343, 427.
training, (606).
- Ophthalmodynamometer, 475.
- Ophthalmological Congress, Colorado, 212,
(868).
- Ophthalmological societies, 76, 130.
American, 295, 470.
American Academy of Ophthalmology
and Oto-Laryngology, 454, 469, 905.
Australasian Medical Congress, 885.
Baltimore, 136, 224.
Belgian, 361, 471.
Chicago, 138, 368, 530, 611.
Colorado, 66, 130, 373, 448, 535, 618, 821.
Heidelberg, 906.
Oxford, 473.
Pacific Coast, 233.
Pittsburgh, 59, 440.
Minnesota, 373.
New York Academy of Medicine, 828
St. Louis, 517.
Section, A. M. A., 229, 387, 465, 687.
Section, College of Physicians, Philadel-
phia, 62, 219, 295, 379, 471, 521, 758, 824.
Section, Royal Society of Medicine, 53,
143, 437, 514, 687.
Swiss, 57.
United Kingdom, 305, 606.
International, 80, 384, 549.
Oxford, 473.
- Ophthalmologists, condition of abroad, 550.
Council of British, 479, 636.
- Ophthalmology, advancement of, 80.
and Master of Surgery, 480.
certificates in, 74, 553.
diploma, 160.
encyclopedia of, (468).
in Paris, 396.
in Syria, 396.
standardization of, 52, 160.
text book of, (Roemer), (471).
unfit in, 320.
waste of energy in, 69.
- Ophthalmomyiasis, 395, 639, 917.
- Ophthalmoplegia, (62), 77, 237, 315, 475, 555,
637, 713, 749, 849, 912.
- Ophthalmoscope, electric, 157, 474.
Liebrieck's, 135.
- Ophthalmoscopy, 237, 314, 316, 474, (538),
555, (621), 637, 782, 911.
- Ophthalmotomy, (624), 851.
- Optical imperfections, their use, 865, (895).
iridectomy, 618.
rhythm, 239, 315.
- Opticians, 300, 480.
in Australia, 80, 885.
- Optic disc avulsion of, (54), (62), 558.
choked, 715, 784.
cupping of, 680.
hole in, 361, (380).
- Optic nerve, 79, 158, 239, 317, 394, 477, 558,
639, 715, 784, 852, 915.
atrophy, 447, 558, 639, 915.
avulsion of, (54), (62).
coloboma of, 158, 394, 558.
injury to, (53), 317, 318, 559.
pathology of, 639.

- structure of, 852.
- tubercle of, 784.
- tumor of, (53), 159, 240, **665**, 852.
- Optic neuritis, (62), 158, 239, 317, 394, 477, (534), 558, 639, 715, 784, 851, 852, (886).
- treatment of, 715, 852.
- Optics, (466), 474, 637, 713, 912.
- Optochin, 158, 317, (768).
- Optometry, see Opticians.
- Orbit, 79, 159, 239, 318, 395, 478, 480, 559, 639, 715, 716, 785, 852, 917.
- and cleft face, 395.
- carcinoma of, 332.
- configuration of, 159.
- dilatation of, (149), 318.
- dimensions of, 79, 639.
- muscle of, (701).
- restoration of, **144**, 239, 318, 559.
- tumors of, 80, 134, 157, 210, 240, 318, 332, 395, 559, 640, 785, 852.
- Orbital abscess, 395, **876**.
- actinomycosis, 715.
- anaplerosis, 318.
- aneurysm, 239, 853.
- cellulitis, 917.
- cyst, 80, 318, (440), 478, 917.
- hemorrhage, 478.
- periostitis, (296).
- phlegmon, 639, 785, 917.
- prosthesis, 239.
- thrombosis, 318, 853.
- varicocele, 159, 318, (361).
- Orbitoplasty, 395, 785.
- Orbitotomy, 917.
- Orientation, 713.
- Osler, Anniversary Volume, **302**.
- Osmosis electric, 716.
- Ossification, 239.
- Osteomata, 785.
- Osteomyelitis, 918.
- Osteoperiostitis, 395, 478.
- Otitis media and paralysis, (766).
- Oxycephaly, 558, 559, 715.
- Painting and the eye, 480.
- Japanese and spectacles, 640.
- technic of, 786.
- Pancreatic insufficiency and pupil, 556.
- Panophthalmitis, 132, 317, 639.
- Papilla, drusen of, (376).
- Papillary stasis and tumor, (545), 784.
- Papilledema, **1**, 158.
- Papillitis, 239.
- Papilloma, 318.
- of cornea, **138**.
- Paracentesis of cornea, **48**, 911.
- of vitreous, 911.
- Paraffin, (613).
- Paraffinoma, 715.
- Paralysis, 157, 237, 314, 475, 713, (822).
- after injury, 637, 912.
- and high myopia, 314.
- and pregnancy, 782.
- juvenile with gummata, 853.
- of sixth nerve, (766).
- postdiphtheritic, **747**.
- sudden recovery of, (375).
- Paraplegia, 477.
- Parasites, 79, (146), 159, 239, 318, 395, 478, 639, 784, 917.
- Parenteral injections, (58), 77, 392, 396, 475, 714, 911.
- Parkinson's disease, 912.
- Paropsia, 394.
- Pathology, 159, 240, 319, 395, (464), 479, 560, 639, 640, 716, 853, 918.
- of senile eyes, 785, (839).
- Pectinate ligament, **675**, **680**.
- Pemphigus, 507, (523).
- Pensions for blind, 716.
- Perception of distance, 851.
- Perimetric chart, **49**.
- methods of study, 392, 911.
- Perimetry, 158, 474, (524), **584**, 782, 911, 912.
- color test in, 713, 784.
- Perithelioma of lid, (687).
- Periostitis, (296).
- Petit mal, and glasses, (65).
- Phakoerisis, (366), 714, **721**, (770).
- Phlyctenulosis necrotic, 714, 783.
- Photoelectric cells and the eye, 394, (544), 639.
- reaction, 79, 639.
- Photography, 77.
- Photophobia, 239.
- Phototherapy, 474.
- Photoperception, 784.
- Physiology of seeing, 316, **865**.
- Pigmentation, 109, 316, 639, 784, **874**.
- Pituitary disease, **135**, **571**.
- Plastic operations, (55), 79, 239, 318, 478, (612), 785.
- Pneumonia and orbital phlegmon, 784.
- Polioencephalitis, 853.
- Polycoria, 475, 638.
- Polycythemia, 560, 716.
- Polyneuritis, 240.
- Poultices, 392.
- Pregnancy, 158, 239, 477, (536), 639, 782.
- Presbyopia, 314, 392, 637.
- Prevention of blindness, 76, 396, 560, 636.
- Printing, optical aspects of, 80.
- Priority in transillumination, 640.
- Prism, 555.
- meter measure, **755**.
- Probes, 559.
- Proboscis, 239.
- Proptosis, 139, 478.
- Protective glasses, 159, 396, **688**, (707), 716, 785.
- Protein, function of, **802**.
- therapy, **93**, 237.
- Prosthesis, **134**, (149), 239, (463), 478, (612).
- gold ball, **497**, 558, (824).
- oculopalpebral, 79.
- Pseudosyndrome, (383).
- Psychic blepharospasm, 715.
- Psychology and the eyes, 240, 784.
- Pterygium, 393, 850, 913.
- Ptosis, 79, 158, 318, 394, (457), (624), 639, (824).
- hysteric, (61).
- Pupil, 78, 157, 238, 315, 475, 556, 637, 714, 783, 850, 914.
- Argyll-Robertson, (147), 157, 475.
- artificial, 315.
- changes in, 157, 637, 914.
- double, 480.
- examination of, 81.

- immobility of, (768), 783.
- inequality of, 315, 475, 714, 850.
- irregularity of in syphilis, (835).
- occlusion of, 637.
- reflexes, 315, 475, 714, 850.
- rigidity, 714.
- shape of in animals, 157.
- sphincter, 476.
- Pupillary distance, 77, 490, 911, 914.
- membrane, (295), (377), 475, 637, 837.
- Pupillometer, (381).
- Purtscher's method of trephining, (443).
- Pyoktanin, 77.
- Quinin, 158, 317, 477, 558, 639, (841).
- Radiant energy, 240.
- Radiography, 914.
- Radiotherapy, 237, 395, 396, 475, 640, 911.
- Radium, 79, 80, 238, 240, 243, 318, 555, 558.
- in cataract, 392, 643.
- in retinal glioma, 806, 872, 917.
- Railway employees, 320, 480.
- Records, day-book and ledger, (381).
- Red Cross in War, (777).
- Refraction, 77, 157, 197, (215), 237, 314, 392, 394, 474, 555, 637, (697), 713, 782, 849, 911.
- and fitting glasses, 481.
- changes with age, 228.
- detection of small errors, 408.
- objective findings in, 597.
- Refractive media, 783.
- Retina, 78, 158, 238, 316, 394, 476, 477, 557, 558, 638, 715, 784, 851, 915.
- circinate degeneration of, 158, 558.
- circulation in, 238, 316, 477.
- fatigue, 915.
- folds, 317, (477).
- pigmentation of, 109, 316, 639, 784.
- regeneration of, (149).
- rupture of, (225), 715.
- sensitiveness of, 784, 915.
- syphilis of, 638.
- Retinal adaptation, 158, 638, 639, 715, 784.
- aneurysm, 641.
- arteries, 48, 158, (452), 641, (762).
- detachment, 57, 143, 158, 238, 239, 316, 317, 394, (437), 477, 558, 639, (696), (697), 714, 715, 784, 851, 912.
- embolism, 158, (224), 239, 477, 556.
- hemorrhage, 78, 111, 477, 558, (624), 652, 657, 851.
- images, 79, 158, 316.
- rods and pigment, 316.
- scotoma, 316, 915.
- phlebitis, 857.
- space sense, 394.
- stimulation, 477, 715.
- tension, 477, 715.
- thrombosis, (451), 558, 855.
- vessels, 158, 239, 477, 499, 715, 818.
- and atmospheric pressure, 158.
- and choroidal vessels, 499, 818.
- anomaly of, 161.
- Retinitis, 715, 851, 915.
- albuminuric 239, 851.
- disciformis, 605, 884.
- exudative, 558, 915.
- hemorrhagic, (226), 238.
- nephritic, 394.
- pigmentosa, (67), 158, (225), 316, 394.
- proliferans, (296), 316, (371), 477, 558, 851.
- punctate, (225).
- septic, 639.
- syphilitic, 638.
- Retinochoroiditis juxapapillaris, 157.
- Retinoscopy, 755.
- Retrobulbar neuritis, 355, 784.
- Rheumatism, 315, 918.
- Rodent ulcer, 238, 315.
- Roentgen ray therapy, 159, (226), 395, 558.
- Royal London Ophthalmic Hospital, 708, (781).
- Rupture of choroid, 133, 318, 640.
- of glaucomatous eye, 557.
- of Morgagnian cataract, 851.
- of retina, (225), 715.
- of sclera, 240, 318.
- Salvarsan, 78, 319, 477, 479.
- Sarcoma, 79, 559, 917.
- intraocular, 732.
- of choroid, 79, 395, 640, 716, 852.
- of ciliary body, 318.
- of cornea, 640.
- of iris, 240.
- of lid, 318, 395.
- of oculomotor nerves, 852.
- of orbit, 318.
- of sclero-corneal junction, (534).
- School conjunctivitis, 637.
- examination, 716.
- for blind, 786.
- trachoma, 240.
- Sclera, 78, 157, 238, 315, 475, 556, 637, 714, 783, (821), 850, 913.
- blue, 78, 157, 315.
- coloboma of, 556.
- foreign body in, (63).
- staphyloma of, 131.
- Sclerectomy, 316, 476, 557.
- Sclerectoiridectomy, 714.
- Sclero-corneal trephining, (146), 238, 316, 557, 638.
- Sclerosis of choroid, (297).
- of conjunctiva, 637.
- Scotoma, 238.
- and refraction, 555.
- ring, 316, 317.
- Scotometer, (886).
- Scrofula, 238, 479, 556, 783, (840), 850, 913.
- Scurvy, 915.
- Serology clinical, 157.
- Serum therapy, 78, 638, 713.
- Shot wounds, (62), 159, 317, (438), 559, 784, 787, 852, 952, 917.
- Siderosis bulbi, 141, 319, (542), (617), 785, 838, 853.
- Sighting eye, 77.
- Simulation, 237, 392, 601, 858.
- Sinus disease, 239, 318, 479, 784, 785, 852.
- and blindness, 396, 852, 915.
- Skeletal symmetry, 319.
- Skiametry, 77, (470), 782.
- Small-pox, 479.
- Smith-Indian operation, 78, 282, 476, (552), 714, 774, 851.
- Society Proceedings, see ophthalmological.

- Sociology, 80, 159, 240, 319, 473, 479, 560, 640, 716, 785, 854, 918.
- Sockets, contracted, 318.
restoration of, (55), 785.
- Sodium chlorid, 637.
- Soldiers, visual examination of, 72.
- Spectacles failure to provide, 80.
fitting of, 157, 481.
history of, 640, 839.
profiteering in, 786.
- Spectrum, 783.
- Speculum, 603.
- Spirochetosis icterohemorrhagica, 240.
- Sporotrichosis, 319, 393.
- Sprays, 392.
- Squint, see Strabismus.
- Staining, corneal, 78.
- Standards of vision, 854.
- Staphyloma of cornea, 78.
of sclera, 131.
- Stereomicrometer, 417.
- Stereoscope, 77.
- Stereoscopic training, (153).
vision, 314.
- Stereopsis, 237.
- Stomach and eyes, 853.
- Strabismus, 77, 237, 314, 315, 318, (441), 475, 555, (620), 713, 782, 912.
and colored glasses, 556.
crown suture in, 849.
- Streptothricosis, 327.
- Strychnin, 639.
- Subconjunctival injections, 237, 475, 637, 884.
- Subconjunctivitis hyperplastic, 402.
- Sulfarsenol, 849.
- Sulphuric acid burn, (822).
- Superior rectus, paralysis of, (59).
- Suture of cornea in cataract extraction, 316, 911.
- Symblepharon, 132, 158, (293), 393.
- Sympathetic disease, 78, 157, 316, 393, 476, 497, 557, 714, 783, 850, 914.
system and pupil, 315.
- Syndrome, Claude Bernard-Horner, 79.
Gradenigo, 912.
Marcus Gunn, (463).
Mikulicz, 559, 624, 639, 785, 852.
Weber, 77.
- Synechia of cornea, 319, (450).
- Synechiotome, 314, (545).
- Synophthalmia, 558.
- Syphilis, 78, 80, 131, 157, 238, 319, 396, (466), 476, 479, 637, 639, 714, 716, (835), 850, 853, 913, 914, 915, 918.
and cataract, 394.
and typhus, 159.
cerebral, 89.
optic nerve, 1.
orbital, (67).
retinal, 638.
- Syringomyelia, 912.
- Tabes, 396, (534), 555, 714.
- Tapayaxin, retina of, 317.
- Tears, absence of, 317.
- Telescope, 911.
- Tendon resection, 475.
- Tenon's capsule, 497.
- Tenonitis, 358, 638, 639, 715.
- Tenotomy, 556, 713.
- Tension, 78, 157, 238, 476, 557, 638, 669, 851, 914.
and keratitis, 637.
arterial 314, (841).
decreasing in tumor of choroid, 872.
normal with loss of vision, (442).
See glaucoma and tonometry.
- Test chart, 637, 911.
colored, 314.
moving, 157.
uniform system of, 702.
object, 5, 314, 911.
- Tetany, 240, 851.
- Tetrahydroatophan, 392.
- Therapeutics, (58), 77, 157, 237, 314, 392, 474, 555, 637, 713, (765), 782, 849, 911.
- Thermophore, 911.
- Thermotherapy, 238, 314, 783, 911.
- Thrombosis, orbital, 478.
retina, (451), 558, 855.
- Tic, spasmodic, 559.
- Tonometer, 48, 476, 669.
- Tonometric chart, 557.
- Tonometry, 474, 476, 557.
and prevention of glaucoma, 669, (896).
manual, 237.
- Tonsils, 79.
and retinal hemorrhage, (226).
- Toti's operation, 477.
- Toxemias and iritis, (828).
- Toxic amblyopias, 158, 239, 317, 394, 477, (534), 558, (623), 639, 715, 784, 851, 915.
alcohol, 158, 558.
arsenic, 639, 915.
barium sulphat, 851.
caffeine, 158.
carbon bisulphid, 784.
ethylhydrocuprein, 158, 317.
eucopin, 915.
methyl alcohol, see wood alcohol.
optochin, 158, 317.
quinin, 158, 317, 477, 558, 639, (841), 915.
tobacco, 394, 558, 852.
wood alcohol, 79, 150, 284, 394, (534), 558, (623), 639, 715, (763), 915.
- Trachoma, 78, 157, (217), 238, 315, 393, 442, 475, 556, (623), 636, 637, 714, 716, 783, 850, 913.
among Chinese, 475.
and flies, 393.
chronic, (225).
diagnosis of, 850.
in army, 78, 157, 560, (622).
in Kentucky, 422.
in Louisiana, 640.
school, 240.
- Transactions, see ophthalmological.
- Transillumination, (621), 640.
- Transplantation, (441), 913.
- Trephining, 87, (146), 316, (364), 393, (443), 638.
- Trial frame, 491.
lenses, 686.
- Trichiasis, 318, 394.
operation for, 433.
- Trichloroacetic acid, 239.
- Tropical eye diseases, 157.
- Tubercle of choroid, 393.
of conjunctiva, (840).
of optic nerve, 784.
- Tuberculin, 78, 79, 319, 716, 849.

- Tuberculoma cerebral, 80.
 scleral, 315.
 Tuberculosis, (216), 237, 263, 315, 395, 396,
 479, 640, 661, 714, 716, (832), 911, 917,
 918.
 of choroid, 557.
 of conjunctiva, 206, 556, 714, (840), 913.
 of cornea, 133, 238, 850.
 of iris, 133, 157, 850, 914.
 of lacrimal glands, 916.
 of optic nerve, 915.
 of orbit, 478.
 of retina, 78, (537), 638, (829).
 uveal, 133, 157, 557, 664, 850, 914.
 Tumors, 79, 159, 239, 318, 395, (438), 478,
 (545), 559, 640, 716, 852, 917.
 cerebral, 394, 477, 736, 852.
 capsule of Tenon, 210.
 choroidal, 79, 144, 240, 318, 395, (621), 640,
 716, 785, 872, 852.
 ciliary region 318, 395.
 conjunctival, 113, 240, 395, 478, 559, 683,
 852, 917.
 corneal, 240, 640, 716.
 eyeball, 80, 159, 478, 559.
 intradural, 852, 917.
 intraocular, 478, 852.
 iris, (66), 229, 852.
 lacrimal, 318, (366), 559, 716.
 lids, 80, 159, (218), 240, 318, 395, 478, 559,
 602, (687), 852, 917.
 optic nerve, 159, 240, 665, 852.
 pituitary, 158, 239, 558, 571, 784, 852.
 pseudo of uveal tract, 397.
 retinal, 318, 395, 716, 852.
 Typhoid inoculation, 80, 479.
 Typhus and syphilis, 159, 918.
 exanthematous, 640.
 Ulcer of cornea, 238, 315, (540), 556, 783,
 850.
 of lid margin, (377).
 Ultrared rays, (58), 688.
 violet rays and cataract, 178, 238, 395.
 Uncinariasis, 915.
 Unciform fossa and lacrimal drainage, (219).
 United Kingdom Ophthalmological Society,
 (305), 606.
 Uveal tract, 78, 157, 238, 315, 393, 475, 556,
 557, 638, 714, 783, 850, 914.
 pseudotumor of, 397.
 tuberculosis of, 557, 664.
 Uveitis, 157, 315, 557, 638, 783, (828), 850.
 atrophic, (625), 914.
 Uveoparotidea, 78.
 Vaccination, 475.
 antityphoid, 78, (829)
 of lids, 103, 916.
 Vaccine therapy, 237, 314, 783, 911.
 Vademecum, 388.
 Varicocele, 159, 318.
 Venesection in hemorrhage, 23.
 Vernal conjunctivitis, 126, 130, 238, 475,
 (523), (541), 556, 637.
 Vertebrate eye, 853.
 Vertigo, 782, 912.
 Vestibular reflexes, 782.
 Visibility of bright lines, 78.
 Vision binocular, 555.
 center of in brain, 79.
 evolution of, 477.
 foveal, 784.
 in Academic Fellows, 157.
 loss of, with normal tension, (442).
 peripheral, 158.
 phenomena of, 158.
 theory of, 715, 784, 911.
 twilight, 162.
 Visual acuity, 319, 335, 392, (843), (885).
 at low illumination, 408, (770).
 tests, 5, 157, 314, 637, 702, (843), (855).
 Visual fields, 49, 51, 79, (620), 639, 784, 911.
 fatigue of, 157.
 in brain tumor, 736.
 in injuries, 558.
 in maniacs, 849.
 relief, 471, 715, 916.
 tubular, 158.
 Visual tracts and centers, 79, 158, 239, 317,
 394, 477, 558, (630), 639, 715, 784, 852,
 916.
 Vitreous, 78, 238, 316, 393, 557, 638, 715, 784,
 851, 914, 915.
 cysticercus in, 290.
 hemorrhage, (224), 238, 638, 715, (829).
 infection of, 316.
 lactic acid in, 78.
 hernia of, 914, 915.
 opacity of, 638, 915.
 origin of, 589.
 prevention of loss of, 316.
 Vossius' ring, 316, 914.
 War blind, 479, 480, 511, (522).
 injuries, 80, 159, (290), 319, 477, 478, 479,
 560, (625), 640, 648, 715, 783, 785, (906).
 ophthalmology, 239, (285), 396.
 Wasp-sting keratitis, 493.
 Wassermann reaction, 315.
 Weber's syndrome, 77.
 Welfare of blind, 80, 396, 479, 480, 560, 640,
 785.
 Westphal's symptom, 475.
 West Point cadets and visual defects, 39.
 Whale, retina of, 316.
 Wood, Casey A., testimonial to, 155.
 Word blindness, 477, 558, 784.
 Xanthelasma, (827).
 Xanthomatosis, 852.
 Xeroderma pigmentosa, 159, 318, 559.
 Xerophthalmia, 77, 393, 475, 556, 783, 913.
 Xerosis epithelialis, (826), 836.
 X-ray, 159, (226), 395, 558.
 in corneal ulcers, 850.
 in treatment of conjunctivitis, 556.
 Yellow ointment, 637.
 spot, 78.
 Young, Thomas, 396.
 Zona, 392, 637, 850.
 Zoster, 78, 158, 475, (540), (619), (687), 756.



NEURO-RETINITIS SYPHILITICA ET PAPILLEDEMA (WÜRDEMANN)

1. EARLY STAGE. 2. MEDIUM, WITH EDEMA. 3. MEDIUM. 4. ADVANCED.
5. INTENSE. 6. CHOKED DISK.

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SYPHILITIC NEURO-RETINITIS.

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SEATTLE, WASHINGTON.

This essay is the result of the surveys of a number of soldiers undergoing specific treatment in the U. S. Army Base Hospital, Camp Lewis, Washington, 1918-1919, together with conclusions drawn from private practice and the literature. A sharp distinction is drawn between true choked disc and inflammation of the optic nerve. The former is an edema, the retina being affected secondarily and true inflammation not necessarily taking place; the latter is an inflammatory process in which the contiguous retina is always affected. The paper deals mainly with the ophthalmoscopic findings, time of origin, duration and termination, with suggestions as to treatment. Experience has shown that therapeutic arsenic medication has had no effect upon the production of this lesion. Authority to publish granted, Board of Publication, S. G. O.

Neuro-retinitis syphilitica is a specific inflammation of the optic nerve and the contiguous retina. There can be no neuritis without an implication of the retina, but this in the light cases is confined to the retinal structures in the immediate neighborhood of the disc, and in others is accompanied by a diffuse retinitis. The inflammation extends into the optic nerve behind the globe to a varying degree in each case. Syphilitic retinitis is always accompanied by more or less papillitis; one or the other may be predominant and thus the lesion in each case may be denominated neuritis or papillitis, retinitis, or neuro-retinitis.

Choked disc is a papilledema which is restricted to the optic nerve, but not alone to the part observable by the ophthalmoscope—the disc,—but the edema exists behind the eye as well. It is not in itself an inflammation, altho in the later stages the infiltration may become so extensive as to cause inflammatory changes; and with this comes extension of the process to the retina, largely from infiltration through the adventitia of the vessel walls. Hence in severe cases of choked disc of long duration, a true papillitis or a true neuro-retinitis may be superimposed.

The specific cause of neuro-retinitis syphilitica is the local action of the toxins of the spirochetæ in the optic nerve, causing a true inflammation, with its syn-

drome of *rubor et tumor (sine dolor)*; the latter sign being substituted in the case of the eye by *amblyopia*, for the visual nerve contains no sensitive fibers except those of sight;—hence the ophthalmoscopic findings and the loss of vision. Contrariwise in choked disc, at first there is swelling but no inflammation; and hence the two signs of redness and loss of sensation do not occur, unless secondarily followed by inflammation or unless exudation be so great that the nerve fibers themselves become infiltrated,—which is seldom the case,—and hence good vision is frequently present in the early stages.¹

In inflammation of the optic nerve and retina, there are vascular changes at first, followed by exudation and edema, then infiltration and hemorrhage; later there is proliferation of the mesoblastic tissues of the vessel walls and of the neuroglia; of these the first group are most marked in acute inflammation, the second in the more chronic, but both are invariably present.²

Choked disc is in the end only the ophthalmoscopic expression of a general edema of the nerve.³ The cause is an edema of the dural sheath, leading to a lymph stasis at the optic foramen and a blocking of the lymph streams from the retina, disc and nerve; and this arises from intra-cranial pressure due to trauma, or inflammatory changes in the membranes

of the brain or spinal cord; to actual increase in the cerebral contents by reason of neoplasms in the brain or cord, or to diminution of its caliber by contraction of its walls, as from depressed fractures of the skull or spinal column, or new growths extending inwards from the cranial surface or spinal canal.

Ophthalmoscopic signs of neuro-retinitis vary with its gravity. At first there may be and usually is, no visual complaint from the patient, and the lesion may be only incidentally discovered. Such was so in nearly all of the cases found in the soldiers examined during the surveys of syphilitic patients at Camp Lewis. In four hundred and sixty syphilitics, there were found fourteen cases of optic neuritis, in only four of which had the patient observed any diminution of vision or eye signs; in ten of these I made paintings of the fundus; in the optic nerve cases only the nerve and contiguous area being represented. The editor of this journal has selected five from this series for illustration of this article together with one of true choked disc.

The mildest grade is shown in Fig. 1, case 39: C. E. P., Pvt., Inf. Co. 3, 166 D. B.—Aged 30, Dec. 27, 1918. No complaint of eyes.—Under treatment for syphilis, Ward 13. V. R. 20/20, L. 20/20. Beginning of the lowest grade of optic neuritis. The upper nasal edges of the disc blurred, slight enlargement and tortuosity of veins.—The choroidal ring is pronounced at macular side. L. E.

Slightly further advanced is that of Fig. 2, case 37: L. R., Pvt., 31 Co. 166 D. B. Age 26, Dec. 14, 1918. No complaint of eyes. Undergoing specific treatment in Ward 13. V. R. 20/20, L. 20/50. Low grade of optic neuritis most pronounced in left eye.—The major vessels normal but increase of minor on disc, which is slightly swollen and macular edge decidedly blurred. L. E.

A medium stage is that of Fig. 3, case 40: B. P., Pvt. 355, Motor Trans. Corps. Age 22, Dec. 27, 1918. No complaint of eyes. Under treatment for syphilis, Ward 13. A medium degree of swelling of disc with distention, great tortuosity and increase of blood vessels. The inferior nasal vein is enlarged and slightly sausage form. L. E.

Another medium stage is that of Fig. 4, case 38: J. B., nurse U. S. A. Age 35, Dec. 24, 1918. Mucous patches tonsils and fauces Oct. 24, 1918. Wassermann ++ Undergoing specific treatment Ward 13. Ten salvarsan, Hg. and K. I. None lately. Blurring of vision Dec 23. V. R. 20/30, L. 20/30. Mild grade neuro-retinitis both eyes. The swelling most pronounced on nasal side. Disc rather pale—no increase of blood vessels. L. E.

An intense degree is shown in Fig. 5, case 41: A. T., Corp. Co. B. 13, Amm. Train. Age 25, Nov. 19, 1918. Noticed two weeks, severe headaches—had chancre in Mar. 1918 before enlistment followed by light secondaries. V. R. 20/70, L. 20/40. Wassermann ++. Referred to Ward 13 for specific treatment. A typical picture of inflammatory swelling of the disc of 5 D, with exudate about vessels and in retina. R. E.

Opportunity was afforded in all these cases for further examinations during the course of the specific treatment. One, two and three made full recovery with return to normal of the ophthalmoscopic appearances; and in none of these cases did I discover any evidence of Thomas' signs. In the fourth case at the last examination, five months after the drawing was made, the discs appeared pale and the blood vessels somewhat contracted, and the characteristic blurred depression of the optic disc was observed. The fifth case passed from observation and hence the result in vision and ophthalmoscopic appearance cannot be stated.

It is perhaps well, here to call attention to the great contrast in the ophthalmoscopic findings of neuro-retinitis and of true choked disc, which is particularly evidenced in Plate 6, case 42: J. E. G., Cpl. Co. 45, 166 D. B. Age 31, 10, 1918. Fracture of skull about fourteen hours before. Unconscious, in Ward 51. Decompression operation by Major Rockey, 11:00 A. M. Death 7:59 P. M. Pupils slightly dilated, especially left, absence of reflex to light, slight divergence, cadaveric position of eyeballs, edema both

discs, veins dilated and tortuous. A typical example of intracranial pressure. R. E.

Here it will be noted that the optic nerve stands out like a button from the depth of the eye. The swelling here was extremely great, fully 6 D., whereas in the low cases of neuritis there is little or no difference in the refraction of the disc and retina. In the mild grades of neuritis it is true that the normal physiologic cup may be filled in by the edema; but the nerve area is yet a little depressed or at least level with the rest of the fundus. Even in a high grade of neuro-retinitis it will be found that the swelling of the nerve scarcely ever exceeds two or three D. Such findings are likewise to be found in optic neuritis from other sources; this occurring in renal disease, diabetes and blood vessel degenerations.

The writer has made several hundred paintings of the fundus, and thus has had occasion to observe minute changes in findings that would not be noticed in ordinary practice; these observations extending over thirty-two years and embracing a very large number of cases. It is his opinion that the cause of an optic neuritis is always due to the setting free of some toxin in the optic nerve itself, attended by infiltration and inflammatory changes in the blood vessel walls extending to the neuroglia, followed by the functional and objective signs. Whereas the cause of edema of the optic nerve, or choked disc, is always mechanical and due to increase of intracranial pressure with a possible exception of pressure on the optic nerve itself within the orbit from trauma or neoplasm, the latter of which he has never observed.

The course of low grades of optic neuritis, from whatever cause, varies from a few weeks to several months and may be followed by complete resolution. In severe types, especially if the systemic origin still obtains, however, these cases go on further and ultimate in more or less grayish atrophy of the optic nerve, in which owing to the deposit of connective tissue at

the edges of the nerve, its periphery always remains somewhat ill defined; in contradistinction to true atrophy, as in tabes or other spinal cord affections, where the edges of the nerve become clear cut, and always in the latter with more or less extinction of sight.

The treatment of optic neuritis is that of its cause. It is generally medication, to eliminate the poison from the system before its local action has caused sufficient inflammatory changes to result in a deposition in, or infiltration of or about the nerve fibers. Thus urgent treatment is indicated;—massive doses of the specific medication. In some cases where the edema of the optic nerve and swelling are great, besides the specific treatment, free diaphoresis by pilocarpin and hot packs, and free purging by alkalines rapidly reduce the local danger of squeezing the nerve fibers from the swelling of their sheaths.

There is no beneficial local treatment. Patients should certainly not subject their eyes to strain, and must protect them from irritating sources of light and heat, by dark glasses or those which cut out the actinic rays of light in large part, as the Noviol or Crookes lenses.

Thus it is in all inflammatory diseases of the eye which are due to syphilis, or in which the latter is a factor, energetic treatment must be given, and to date for this purpose, arsenic and mercury are the most powerful remedies that we possess.

It is believed by the writer that the reports of blindness, and especially of cases of optic neuritis from the use of therapeutic doses of arsenic, made some years ago, were improperly promulgated and imperfectly substantiated. Certainly six months observation of the very considerable material met with in the Base Hospital, and from years of private practice, have shown that in therapeutic doses arsenic in the human being has produced no untoward effect upon the eye. Further, clinical evidence supports the view, that where cases of inflammation of the retina and the optic nerve arise in

syphilis, their course has been hindered by the administration of arsenic; in fact, in all such cases the lesions have melted away leaving little or no trace of inflammatory products or degenerations. No cases of optic nerve atrophy have been observed even where such patients have given histories of many salvarsan injections; one of them having received twenty-seven such, in addition to large doses of mercury and the iodides during several years. It is believed by the writer, and is substantiated by others, that the ocular lesions occurring in syphilis are due to the irritating effects of the toxins of the disease. It may be that in the course of strenuous treatment that the spirochetæ may be more or less suddenly released from their local environment, and thereby set up a certain amount of active irritation, which may be seen in the eye as an inflammation of the optic nerve.

In support of this contention the writer together with Captain John A. Johnson⁴ M. R. C., U. S. A., made certain investigations upon rabbits by administration of therapeutic and likewise excessive doses of arsenic, using the staple therapeutic syphilitic medication (arsphenamin) for the purpose. Some of these rabbits died, others were under observation after four months.

In none of these has any ocular lesion been produced thereby. Certainly this experimental study, as far as it goes, shows that arsenic has no effect upon the optic nerve. And this is in direct opposition to the previously conceived notions on the subject and especially against the observation of de Haas,⁵ who in eight thousand cases of optic nerve diseases found ten of optic neuritis or optic nerve atrophy ascribed to arsenic, and quotes five others. None of these, however, were due to arsenic used for the treatment of syphilis, but were from wall paper, paint, and tooth filling origins.

From these surveys and in previous clinical experience, the writer has found in a large number of cases ophthalmoscopic evidences of syphilis, without other signs; and of the existence of which the patient was unaware, and this in recent years has been substantiated in every case by complement fixation tests. Thus the ophthalmologist may become of great importance as a diagnostician.

From these surveys and previous several ophthalmoscopic examinations and every case in which luetic lesions are found by incidental examinations of the oculist, should receive complete specific treatment.

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TEST OBJECTS FOR THE ILLITERATE.

A. E. EWING, M. D., F. A. C. S.

ST. LOUIS, MO.

This is an historical description of such test objects suggested by different writers from 300 B. C. to 1918 A. D., with illustrations of them and discussion of the principles that should control the selection of objects for such tests. Read before the St. Louis Ophthalmological Society, April 22, 1918.

The importance of this subject is brought home to the ophthalmologist in the realization that the illiterate test object, or an object that may be recognized and interpreted by any person, child or adult, ignorant or educated, anywhere in the world, is the basis for all other test objects. An example is the two stars by which Hooke determined the standard visual angle as the angle which subtends an arc of one minute. Ophthalmology is deeply

certain measure of distance at which it can no longer be seen, the angle Γ does not appear, and only the points ΔZ are seen. This will happen equally in the case of the three remaining angles. Thus the whole will appear to be a periphery (or curve).

The clearness of this reasoning has never been gainsaid. Altho the art of writing had been in existence for thousands of years, this is the first definite measure of visual acuity that is

θ'.

Τὰ ὀρθογώνια μεγέθη ἐξ ἀποστήματος δρώμενα περιφερῆ φαίνεται.

- ἔστω γὰρ ὀρθογώνιον τὸ $B\Gamma$
 10 ἔστως μετέωρον ἐξ ἀποστήματος δρώμενον. οὐκοῦν, ἐπεὶ ἕκαστον τῶν δρώμενων ἔχει τι μῆκος ἀποστήματος, οὗ γενόμενον οὐκέτι δρᾶται, ἢ μὲν Γ ἄρα γωνία οὐχ
 15 δρᾶται, τὰ δὲ Δ, Z σημεῖα μόνον φαίνεται. ὁμοίως καὶ ἐφ' ἑκάστης τῶν λοιπῶν γωνιῶν τοῦτο συμβήσεται. ὥστε ὅλον περιφερὲς φανήσεται.

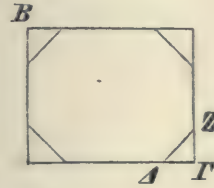


Fig. 1. The first recorded visual test, devised by Euclid 300 B. C.

indebted to Ed. Pergens, Maeseyck, Belgium, for his researches in visual acuity, in which the above subject is included and from which an important part of the following article is taken.

Discussions with regard to the acuity of vision evidently existed in the time of Euclid, 300 B. C., at least in the minds of scientific men, as is shown by the following proposition quoted from his work on optics.¹ (Fig. 1.)

Translation: Rectangular magnitudes when seen from a distance become peripheries (or curves).

Let the right angled figure $B\Gamma$ be elevated and seen from a distance. Then, since each visible thing has a

recorded, and the principle involved is still the most valuable in the selection of objects for the practical determination of visual acuity. Even this deduction of Euclid appears to have found no practical application during his time or for centuries later, as the next mention of an investigation into visual acuity is that Ibn el Haitham in the 11th century employed a written text for certain researches in physiologic optics²

For determining the degree of myopia in the illiterate Daça de Valdes,³ an optician, in 1623 made use of mustard seed. These were placed in line and the patient was per-

mitted to approach until they were recognized. This was the visual far point of the patient from which the strength of the glass to be worn could be computed. For taking the measurements Daça employed a rod, on which the curvatures of the glasses for various distances were computed. With persons who could read he had recourse to the prayer-book. Other opticians of his era, and those preceding him from the time of the invention of spectacles early in the 14th century, probably employed such test objects as each individually preferred.

Previous to the invention of spectacles, the fitting of which required some well-defined test object, the method mentioned as being ordinarily employed for determining the vision was to approach the eyes with the hand, or with the hand having the fingers spread apart, and if the patient did not blink he was considered to be blind. However, in contradistinction to this, "sharp as a needle" and "fine as a hair" seem to have been common expressions. In the New Testament the mustard seed is mentioned as the "least of all seeds." As seeds were employed by Daça de Valdes and later by Lawson⁴ for testing vision it is possible that they may have found some such use among the ancients. The earliest record is found in the New Testament (Matthew 13, 31; 17, 19, Mark 4, 31; Luke 17, 6.). At the present time seeds are used for testing the vision of people in India, as is shown in the following passage from an article entitled "Another New Operation for Cataract" by Tasadduk Husian⁵, "963, including 146 bad cases, recovered, i. e., had sufficient vision to read or to recognize *cereal grains* with glasses."

With regard to the theory of the sense of vision, the anatomy and the physiology of the eye, and the manner in which vision is produced, a great deal was written, ancient and medieval, but it was Robert Hooke who established the angle of vision as the angle subtending an arc of one minute. This he deduced by observations on closely approximated stars. In a discussion

with regard to the construction of astronomic instruments before the Royal Society of London, January 15, 1674⁶, he demonstrated by means of a rule with proper divisions for definite distances that it was impossible to distinguish divisions of less than one minute with accuracy. Later in the same year he showed that the eye could not distinguish heavenly bodies separated by an angle of less than thirty seconds and only with difficulty could one person in a hundred distinguish such bodies separated by an angle of one minute. Following this the discussions of vision and visual acuity by scientific men were numerous, but no practical attention was given the subject in connection with the examination of the eyes.

The first types that were arranged for the purpose of testing the vision were printed in 1816 under the direction of Tauber⁷, a Leipsic physician, who conducted an optical institute. Characters were first employed by Küchler in 1835 or 1836, who cut from almanacs small black pictures of men and women, cannon, guns, birds, farm implements and animals, and pasted them on paper in the order of their size, and used them as test objects in the measurement of vision. Because of the inequality in the legibility of the pictures due to the variety of their outlines, he recognized that the choice among them as test objects was limited.

Küchler was also the first to suggest a standard for testing the vision of patients, which could be employed by anyone anywhere. As he expressed it:

"(1) A measure of vision for those with weak eyes, and a measure that would be common to all practitioners.

"(2) A measure of vision by which the same patients could be tested at varying intervals of time, and a measure of vision that would be recognized by all physicians as being exact."

With regard to the employment of such tests his rules were:

"(1) To have several letters or words for the same distance which could be interchanged.

"(2) The tests should be printed in type of the same size on the same unglazed white paper.

"(3) Best that only one number at a time be exposed.

"(4) The weaker eye should be measured first and always by good daylight.

"(5) The light should come from the side in order that there should be no dazzling and no loss of light.

"(6) Atmospheric conditions that change the intensity of the light should be taken into account in making the measurements."

To Küchler belongs the further cred-

every fifth post one and one-half times the height of the palings, as shown in Fig. 2.

Its visual range was from one to twenty Vienna feet, the line No. 30 being for 20 feet. The width of the first line was 0.0037 of a Vienna foot (the Vienna foot is 12.4 English inches). The point in the examination was to distinguish the white spaces in the fence as far along as possible. It was excellent vision to separate the lines at 80 (not shown in the accompanying diagram), altho eyes endowed with better vision could separate them three to five lines beyond this number. This

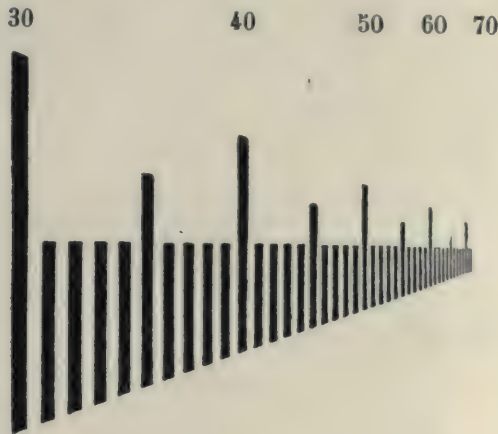


Fig. 2. The second recorded visual test for illiterates. Devised by Eduard Jaeger, 1854.

it of having first arranged test letters in series, but only for testing the near vision. The ratio was irregular and ranged from 1 to 12 with the heights of the letters varying from 1.5 mm. to 21.5 mm.

In 1854 Eduard Jaeger⁸ published the first test-type to be employed for measuring the distant and the near vision. He included with this set of test-type a series of lines arranged in logarithmic progression (= logarithmic scale or geometric progression) varying in length and width, with a white line next a black line, equal in width to the black line which it followed. This test had the appearance of a paling fence seen in perspective, with every tenth post twice the height and

was an important step forward in the construction of test characters, in that it was the introduction of white and black lines of equal width and in geometric progression. As this test could be employed with anyone, it may be counted as the second standard illiterate test, that of Euclid being the first.

The next tests for illiterates were those arranged by Streidinger, at the suggestion of Deputy Inspector-General T. Longmore, in 1860, for testing the eyes of recruits for marksmanship in the English army, each eye being examined separately. They were designated by Longmore "miniature bull's-eyes." They consisted of round black dots irregularly arranged in

groups of from 2 to 9, with a space between the dots about equal to the diameter of the dot. Their size was based on the principle of a bull's-eye, 3 feet in diameter to be seen at a distance of 900 yards. The accompanying illustration, Figure 3, shows one of the plates.

The dots were printed on cardboard, which was mounted in a frame that was arranged to carry another mov-

in sizes with Jaeger's test-types for those who could not read, were recommended for testing the power of vision. Since that paper was written, Professor Snellen of Utrecht has published a regular series of types of fixed dimensions, possessing certain definite relations one type with another. They present several advantages over Jaeger's types for military use, particularly for meeting cases where it is supposed that

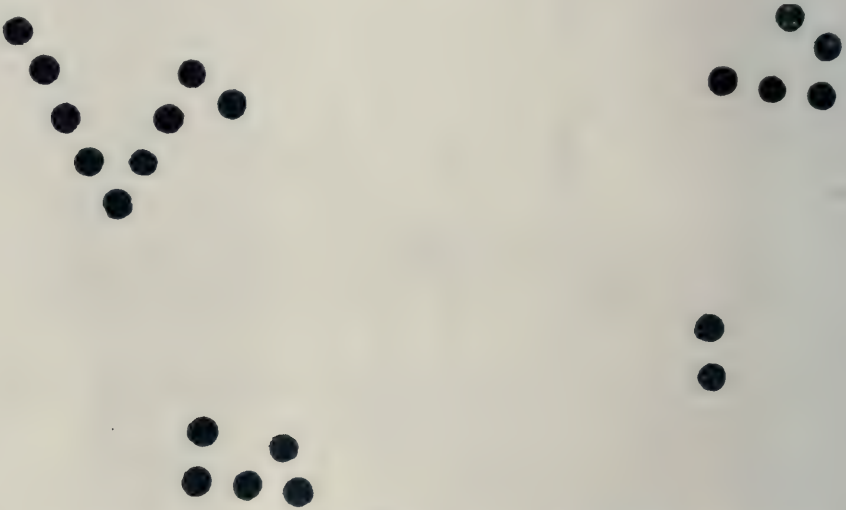


Fig. 3. The third recorded visual test for illiterates. Devised by Streidinger and Longmore in 1860.

able cardboard in front of the dots so that only certain groups could be exposed at one time. The requirement of the service was that the dots in each group should be counted by each eye separately.

This test was later modified by Snellen to correspond to the 1 and 5 minute scales of Donders. Longmore⁹ says, with reference to this modification by Snellen:

"In the volume of the Army Medical Reports of 1860, I published some observations on the examination of the visual fitness of recruits for military service, with special reference to instruction in the use of the rifle. In these notes sets of types, numbered in accordance with those assorted for universal reference by Professor Jaeger of Vienna, and sets of dots corresponding

deception is attempted; on the one hand, to make it appear that the sight is strong enough for a soldier, on the other to prove the existence of a defect for the purpose of escaping military service. On this account I have recommended their issue for the use of army surgeons, and the Right Hon. the Secretary of State for War has been pleased to sanction the expense incurred by their distribution. Dr. Snellen's preface to his collection of optometric test types explains the principles on which they have been designed and the manner in which they are employed. I need not, therefore, refer at greater length to the subject here."

In 1862 Snellen published his system of tests arranged on the plan of a one minute line and a one minute space in

a square of five minutes, previously suggested by Donders in the same year. Also for expressing the visual acuity he adopted the formula of Donders $V = \frac{1}{d}$. His test types were an

improvement on anything previously published, in that the lines or the strokes of the letters or characters were of an even width. This edition contained the checkerboard and the three lines placed both vertically and horizontally, but they were intended for the detection of astigmatism. In the edition of

different positions, up, down, right, and left. The several designs of Snellen with the exception of the three minute two line figure are shown in Fig. 4.

While we may rightly consider the rectangular parallelogram of Euclid, the paling fence of Jaeger and the "Miniature Bull's-eyes" of Longmore and Streidinger as illiterate tests, to Snellen belongs the credit of having introduced individual characters arranged on a definite scale, by means of which the vision of illiterates could be measured and compared by oculists in any part of the world.

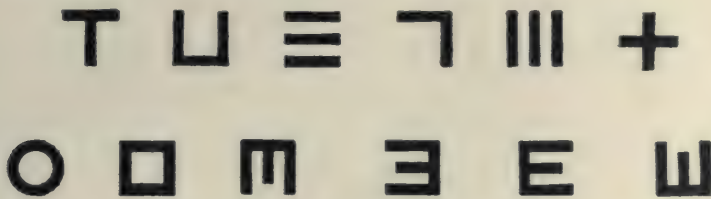


Fig. 4. The fourth recorded visual test for illiterates. Devised by Hermann Snellen, 1862-73.



Fig. 5. Example from illiterate tests by Burchardt, 1870.

1866 he purposely included for illiterates a wall chart which contained the checkerboard, the ring, the square, the three lines placed both vertically and horizontally, the L, the interrupted five minute square, the T and the Greek or St. George's cross, the L and the interrupted square being employed in different positions.

In the edition of 1868 he introduced another card for illiterates which was headed with the square and followed by the interrupted square and by two parallel lines three minutes apart, each placed in the different positions, up, down, right, and left. In the edition of 1873 he made a further change by the final adoption of the E placed in the

During the year 1870 Burchardt published his "Internationale Sehproben zur Bestimmung der Sehschärfe und Sehweite." These consisted of the dots of Longmore and Streidinger arranged in squares, but irregularly, with the space equalling the diameter of the dot, the angle for the size of the dot being 2.15 minutes. The edition included both near and distant tests, with twelve intervals for those for the near, from 6 to 23 inches, and four intervals for those to be used for the distance, beginning with 3 and 2/11 feet and ending with 51 feet. A plate from these tests is shown in Fig. 5.

Also in 1870 Boettcher published his "Geometrische Sehproben zur Bestim-

mung der Sehschärfe bei Functionsprüfungen des Auges," in which he included four plates that consisted of groups of squares and rectangles, an example of which is shown in Fig. 6. They were arranged on the basis of a two minute angle for the squares. The rectangles are the width of the squares, but some are twice, some three times longer than this width. There is always a two minute space between the squares or

acters were the heart, the club, the spade, and the diamond, all in solid form, and he included the ring and the square of Snellen. These were printed in white on a black ground. Nine years later, in his edition of 1883, he added to these characters the triangle, the T, the L, and the interrupted five minute square, and the diamond with a black center. In both editions he employed the one and five minute angles for the lines and for the



Fig. 6. From the visual tests of Boettcher, 1870.

rectangles in the group, and in places a four or a six minute space.

His reasons for introducing these tests were that many persons could not readily comprehend the Snellen Latin type, for instance children. Also, being in geometric forms they were more accurate than other tests. This made them of especial value for army ex-

sizes of the characters. These characters are illustrated in Fig. 7.

Marini¹⁰, medical military physician for Bologna, published a set of characters for testing illiterates in which he added to the square, cross, L and ring of Snellen the horseshoe, the trident, the hook and the key. These are shown in Fig. 8.

They were arranged on the basis of the



Fig. 7. The illiterate tests of Galezowski, 1874-1883.

aminations. In the examination it was required that the number of figures in each group be counted and the difference in their sizes indicated. The figures were unlearnable because they could be turned into several positions. They possessed a further value in that they could be employed in the correction of astigmatism, because the long axis of some of the figures was at right angles to that of others having the same range of visibility.

Several new characters were added to the illiterate test list by Galezowski in connection with a set of test types published by him in 1874. These char-

acters were the heart, the club, the spade, and the diamond, all in solid form, and he included the ring and the square of Snellen. These were printed in white on a black ground. Nine years later, in his edition of 1883, he added to these characters the triangle, the T, the L, and the interrupted five minute square, and the diamond with a black center. In both editions he employed the one and five minute angles for the lines and for the

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the pointing forefinger, an apple, a hammer, a dagger, a hand glass, eyeglasses, a crown, and a heart, each figure being in a small square. There were seven sizes, ranging from one to eighteen mm. in height. Evidently they were unsatis-

consisting of a five minute black line one minute in width, a one minute space, a three minute black line one minute wide, a one minute space and a black square one minute in size. This design is shown in Fig. 10, together with the three line



Fig. 8. The illiterate tests of Marini, 1875

factory, as they were omitted from the second edition published in 1882. In the third edition, published in 1885, the E of Snellen was adopted.

In 1884 Professor Pflüger, Bern, Switzerland, published a set of type, "Optotypi," based on the one and five

test of Snellen and two letters.

This group also illustrates the manner in which the letters and the characters were arranged in other groups. Pflüger

employed the Snellen formula $V = \frac{d}{D}$



Fig. 9. The illiterate tests of Albini, 1878.

minute scale of Donders, in which he arranged letters with characters for the illiterate on the same line, the characters being some of those of Snellen, viz: the square, the cross, the two parallel one minute lines placed three minutes apart and the parallel lines. Also he employed the E with the center line shortened two minutes. To these he added a new design which is an inverted pyramid

and dedicated his work to his friend Snellen.

Because of the difficulty in inducing children and stupid illiterates to name the position of the Snellen E, or to hold its duplicate in the hand in the same direction as the character on the chart, the author constructed a set of test-type for illiterates in 1886 which consisted of the square, the ring, the cross, the crescent,

the horseshoe, the pitcher, the star, the straight chair and the rocking chair. The interval chosen for these characters was the geometric ratio $\sqrt{\frac{1}{2}} = 0.7071$, first proposed by Dr. John Green at the American Ophthalmological Society, 1867; and the range of distance was from 3.5 meters to 56 meters. As characters dif-



Fig. 10. To the right is shown the new illiterate character by Pfüger in 1884.

thalmological Congress in London, 1872, in order to secure better legibility and better proportions for the letters. The gradation for these letters was in the geometric ratio $\sqrt[3]{\frac{1}{2}} = 0.7937$ proposed to the American Ophthalmological Society in 1868. These letters and characters were constructed on the one and five minute scale. The characters are shown in Fig. 11.

Experience with these characters demonstrated that the crescent was worthless as a test object, that the out-

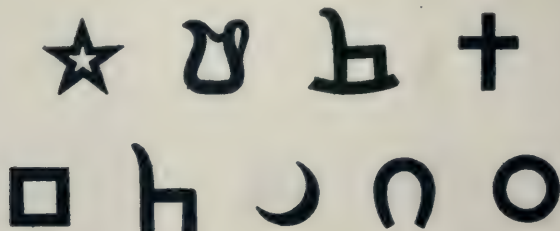


Fig. 11. The illiterate tests of Green and Ewing, 1886.

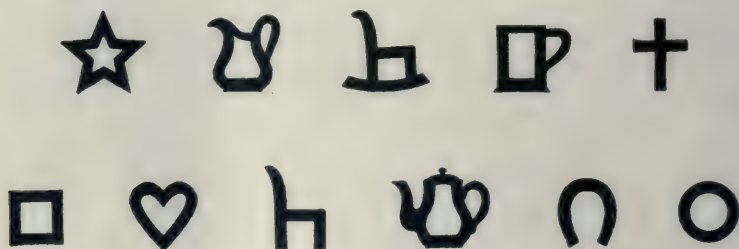


Fig. 12. The illiterate tests of Ewing, 1902.

fer from letters in that they may vary slightly in size without offending the eye, the five minute square constructed of one minute lines, arranged for forty meters, was assumed to be the normal and the other characters were drawn to have as nearly as possible similar legibility. These characters were printed in connection with a set of test type arranged by Dr. Green and the author, which consisted of block letters in which the finish of the letters was made of half squares instead of full squares, as in the case of the Snellen letters. This change was suggested by Dr. Green at the Fourth International Oph-

thalmological Congress in London, 1872, in order to secure better legibility and better proportions for the letters. The gradation for these letters was in the geometric ratio $\sqrt[3]{\frac{1}{2}} = 0.7937$ proposed to the American Ophthalmological Society in 1868. These letters and characters were constructed on the one and five minute scale. The characters are shown in Fig. 11. Experience with these characters demonstrated that the crescent was worthless as a test object, that the out-

legibility of all of these characters compares favorably with test letters of the same approximate size so that they may be readily interchanged. The characters of the edition of 1902 are shown in Fig. 12.

The broken ring test, Fig. 13, was introduced by Landolt, Paris, France, in

minute angle of Donders employed by Snellen.

As an addition to a set of test types, letters and figures published by him in 1892, Wolffberg included a card of illiterate tests arranged on the one minute scale for the thickness of the lines, but he ignored the five minute angle for the



Fig. 13. The illiterate test of Landolt, 1888.

1888. The ring was selected because of its continuous outline and round form, no one part of it being more readily recognized than any other part. Twenty-one years later this test object was adopted by the International Ophthalmic Congress as the standard international test object, by which all other test objects should be graded.

In 1889 Dr. Arnold Lotz, Basil, Swit-

size of the objects. These pictures are shown in Fig. 16.

In 1910 he revised these picture tests and brought them nearer to the standard five minute angle in size. Also, instead of employing the usual continuous lines, he constructed the lines by adjoining dots to one another, in black or white, dependent upon the background. These later pictures are constructed on his idea



Fig. 14. The illiterate tests of Lotz, 1889.

zerland, published his "Internationale Sehprobentafel," Echelles Internationales, which differ from those of Snellen by the employment of a single line vertical and two lines horizontal or vertical and the St. Andrew's cross. They were arranged on the one and five minute scale for distances of from 6 to 60 meters. Fig. 14.

A new test object on a one and three minute scale, the "Interrupted Square" (Fig. 15) was introduced at the American Medical Association by Dr. Edward Jackson in 1891, his purpose being to obtain a test object which would be legible and yet smaller than the standard five

of bases and indices, the bases being of two orders, the oval and the line. The index is a dot or a square which subtends the angle of one minute. This principle was illustrated by Descartes in 1637 as a visual unit. The oval, according to Wolffberg¹², is constructed of ten indices in continuity and the line of five indices in continuity. He takes a general form such as a rectangular parallelogram and by adding indices in dots he constructs a pennant. In a similar manner he constructs a wagon from the parallelogram when placed in the horizontal position, or by placing it in a vertical position he constructs a mug. The object is thus

defined by the number and position of the indices. These figures are illustrated in Fig. 18 on a white background and in Fig. 17 on a black background.

In the same article and the same year Wolffberg introduced his Cross-point test, which consists of four squares each three minutes in diameter, three of them black and the fourth black with a central white dot one minute in diameter constructed in the form of a cross about a central white square three minutes in diameter, Fig. 19. It is employed by designating the position of the square containing the white dot.

Wolffberg¹³ designed another test in 1915 which he designates as his "Line-point" test. This test consisted of an

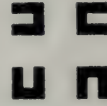


Fig. 15. The illiterate test of Jackson, 1891.

octagonal board on one side of which at the center was a line one minute in width and five minutes long. On the other side there was a line seven minutes long with a one minute break one minute from the

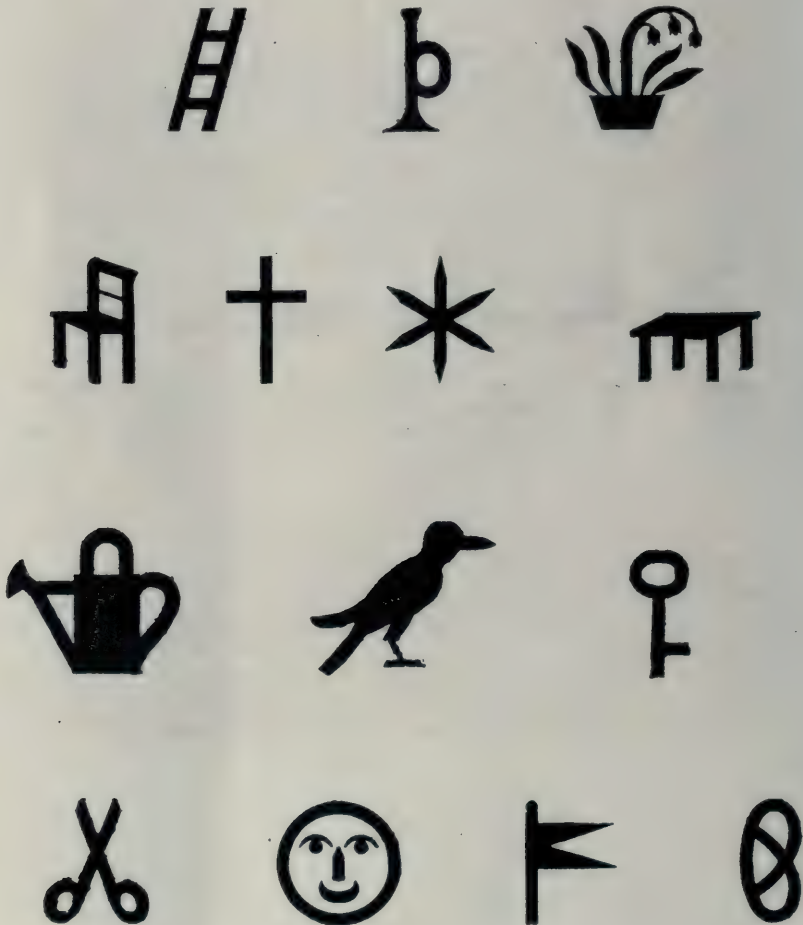


Fig. 16. The illiterate tests of Wolffberg, 1892.

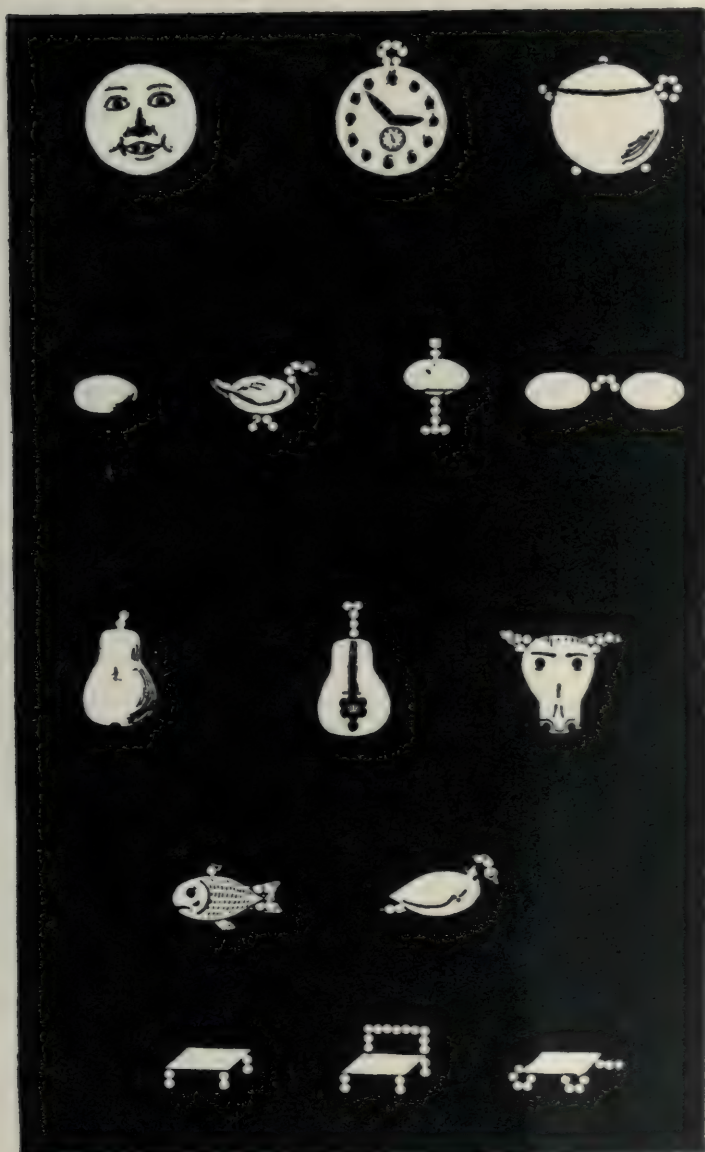


Fig. 17. The illiterate tests of Wolffberg, 1911, on a black background.

end, that is a line one minute wide and five minutes long, a one minute break and a one minute square. By reversing the octagonal board the patient was to

The "miniature bull's eye" of Longmore was employed by Guillery, Cologne, Germany, 1891, by placing a single dot somewhere in a rectangle or a square



Fig. 18. The illiterate tests of Wolffberg, 1911, on a white background.

determine the line which contained the break. The test was arranged on an octagonal board in order that it might be turned in any direction for the detection of astigmatism. It is illustrated in Fig. 20.

which was constructed with heavy lines. His object in introducing this test was to obtain the simplest form of test-type, which would also be mathematically correct. The visual test was to recognize the position of the dot within the square.

An example of this test object is given in Fig. 21.

In addition to this he employed, as tests for near vision, the figures shown in Fig. 22, and planned them to correspond to certain sizes of the Jaeger type.

Instead of the one minute visual angle he selected the angle of fifty seconds and arranged the test objects for distance for the several ranges 5, 7, and 10 meters on a visual percentage basis.

In 1893 Pergens utilized as an illiterate test object the three line five minute test

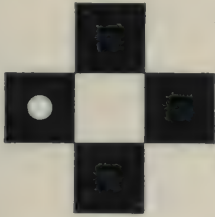


Fig. 19. The "Crosspoint" illiterate test of Wolffberg, 1911.

of Snellen by blocking the lines at one end with a fourth one minute line, thus forming an E (Fig. 23) with the three horizontal lines equal in length. It was utilized by the open end being turned in different directions the same as the Snellen E.

Taking the idea from the act of testing the vision by means of the fingers, spreading the index and middle fingers and closing the thumb and the third and fourth fingers, Albrand in 1894 published a set of illiterate tests on the Snellen scale which consisted of two one minute lines, five minutes in length joined in an acute angle, Fig. 24. It was employed by being turned in different directions.

This test was employed for the wall chart. For the near test he employed the one minute squares, which were first introduced by Snellen, and were later used by Boettcher in connection with rectan-

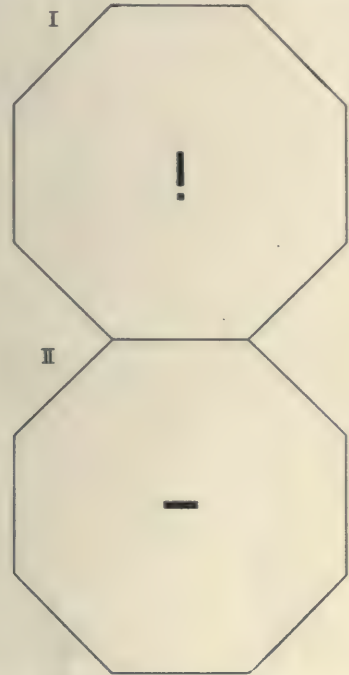


Fig. 20. The "Line point" illiterate test of Wolffberg, 1915.

gular parallelograms. A plate from this test is shown in Fig. 25.

In 1900, Praun reasoned that because the clock was in common use and a familiar object to everyone a design of the two hands in various positions would be a valuable test object. He followed up the thought by constructing and publishing

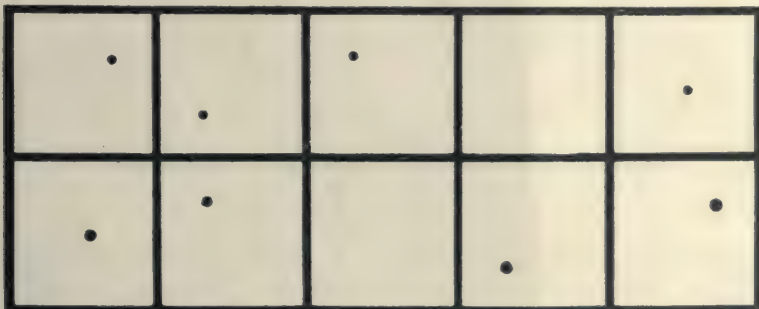


Fig. 21. The illiterate test of Guillery, 1891.

a series of test objects on this plan ; using the one minute angle for the thickness of the line, a four minute angle for the length of the short hand of the clock, and a five minute angle for the length of the

away the corners of the blocked end of the test, as is illustrated in Fig. 27, his purpose being to equalize the black of the two ends of the test. It was employed by turning in different directions

No. 3. (Jaeg. ca. 6.)

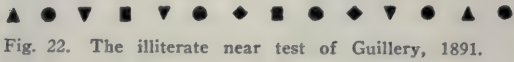


Fig. 23. The illiterate test of Pergens, 1893.

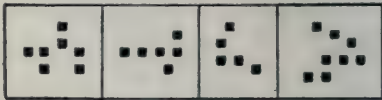
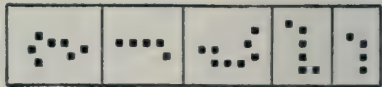
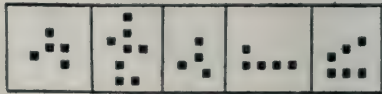


Fig. 24. The illiterate test of Albrand, 1894.



long hand as shown in the diagram, Fig. 26. The test was to locate the position of the hands.

In connection with an edition of test letters published by him in 1901, Von Ammon employed as an illiterate test the figure of Pergens modified by cutting

Fig. 25. The illiterate near test of Albrand, 1894

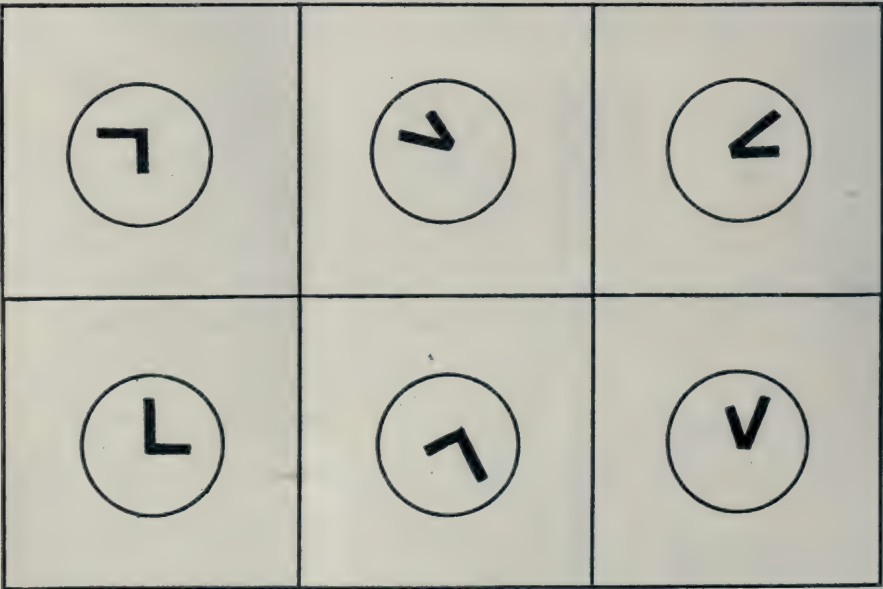


Fig. 26. The illiterate test of Praun, 1900.

as with the Snellen E. He also employed the Snellen formula.

In 1903 Heimann reintroduced for an illiterate test the hand with a pointing forefinger drawn on the one minute scale

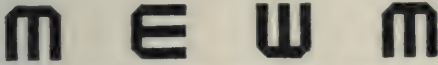


Fig. 27. The illiterate test of Von Ammon, 1901.



Fig. 28. The illiterate test of Heimann, 1903.

for the finger. The manner of using the test was by pointing the finger in different directions. This test is illustrated

Fig. 28. As will be seen by consulting in Fig. 10, this test was first proposed by Albini.

In connection with his valuable work "Refraction," Dr. Thorington in 1908 published the miniature of an illiterate test card which was originated by him and included many new test objects. These test objects are illustrated in Fig. 29.

Dr. Ed Pergens introduced a set of primary tests in 1909 which consist of a visual unit in the form of a square for the purpose of determining position, position in connection with an angle, median aperture, aperture to the side, aperture at the corner, aperture at the peri-

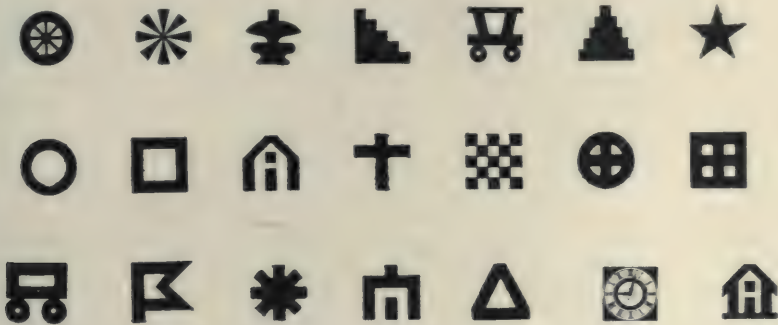


Fig. 29. The illiterate tests of Thorington, 1908.

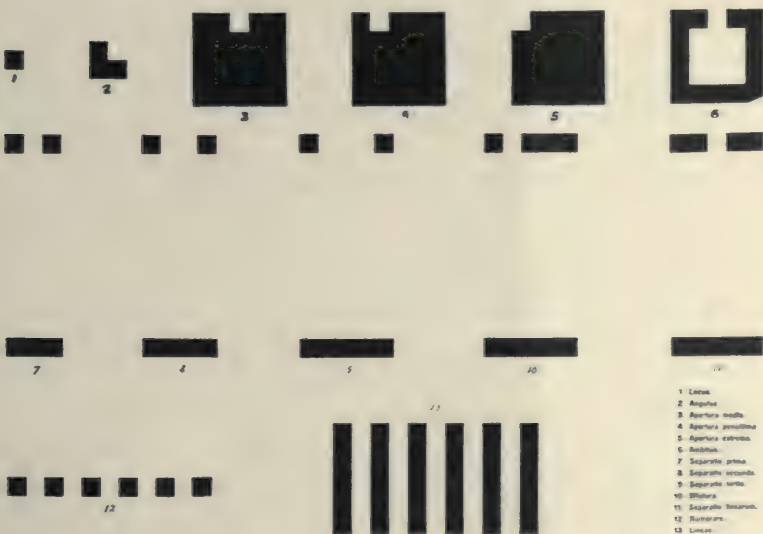


Fig. 30. The "Primary" tests of Pergens, 1909.

phery, primary separation, double or secondary separation, treble or tertiary separation, confusion separation, central linear separation, numerical point separation, numerical line separation, all on the basis of the one and five minute tangent. These are illustrated in the order named in Fig. 30. This is a valuable set of primary tests and they are beautifully and accurately executed.

test for the patient was to select the shortened line in the group of lines.

With the purpose of producing a practical one and five minute uniform test which would be central, the author suggested to the American Ophthalmological Society, 1916, that a one minute break be placed in the central line of the three line one and five minute test of Snellen, this to be arranged with other three line

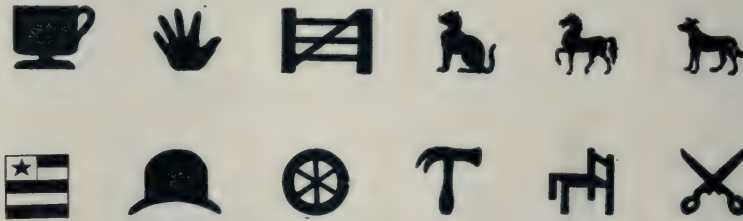


Fig. 31. The illiterate tests of Reber, 1911.

In 1910 Dr. Percy Fridenberg¹⁴ introduced his "Stigmometric Card Test for Illiterates," which consists of group arrangements of the round dots of Longmore and Streidinger for the near test, and for the distance test the square dots first suggested by Snellen in 1862 and in 1870 employed by Boettcher in groups; the near tests with the Jaeger interval, and those for distance with the interval of Snellen, all on the one minute scale of Hooke.



Fig. 32. The illiterate test of W. G. McKinney, 1915, The American Railway Association. Employed in groups with one or more of the longer lines added.

A test card for illiterates was presented to the American Medical Association in 1911 by Dr. Wendell Reber, which contained several new test objects as may be seen from the accompanying illustration, Fig. 31.

In 1915 Dr. McKinney of the American Railway Association printed for the use of the Association a set of Snellen's one and five minute lines, using them in groups of two or more by shortening one of the lines to a four minute tangent as shown in the diagram, Fig. 32. The

one and five minute groups, the test being to select from the several groups the group containing the one minute break. This test has also proved useful in the detection of astigmatism, for which Snellen originally designed the three line one and five minute test. Examples of several arrangements of this central broken line test are given in Fig. 33.

Since the reading of this article, the Ophthalmic Section of the American Medical Association has adopted the recommendation of its Committee on the Standardization of Test Cards, which was published in the *AMERICAN JOURNAL OF OPHTHALMOLOGY*, February, 1919. This recommendation included a cut (Fig. 34) of the characters selected from all characters heretofore presented on this subject, and gave the following principles upon which the selection was based:

1. The lines of which the chief framework of the character is constructed should each subtend the angle of one minute.

2. The main body of the character should conform to the five minute visual angle.

3. Slight unobtrusive variations may be made in the lengths of the lines of the characters beyond the five minute angle in order to insure legibility, as it is prac-

tically impossible to construct pictures of ordinary well known objects in the five minute space with lines of one minute thickness.

4. Masses of black are undesirable.
5. Lines finer than would subtend the

(1) 300 B. C.—Determination of the visual limit by Euclid.

(2) 1623 A. D.—Practical determination of vision by means of mustard seed and by use of print in the prayerbook. by Daça de Valdes.

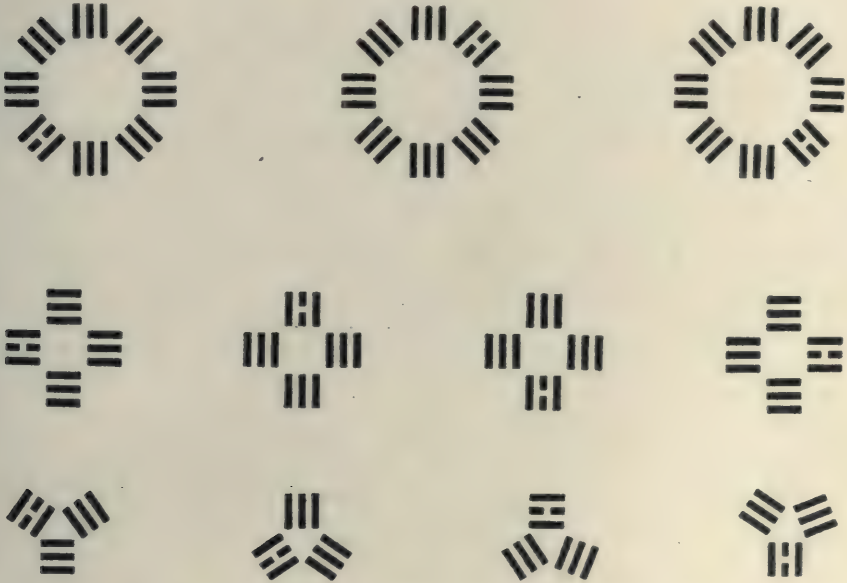


Fig. 33. The uniform central broken line test of Ewing, 1916.

angle of one minute are to be avoided in the body of the character.

Chronologically arranged the various steps in the development of the illiterate tests are:



Fig. 34. Characters selected by the Ophthalmic Section of the American Medical Association as the best so far devised for illiterate test objects.

(3) 1674.—The one minute visual angle established by Hooke.

(4) 1835-36.—Gradation of type, selection of light, selection of paper, and arrangement of pictures for testing the vision by Küchler.

(5) 1854.—Use of lines and spaces in logarithmic progression (= geometric progression) for determining visual acuity by Eduard Jaeger.

(6) 1860.—Employment of dots for testing the vision, by Longmore and Streidinger.

(7) 1866.—Employment of geometric forms of practically equal size by Snellen.

(8) 1870.—The introduction of one minute squares and one and three minute rectangles by Boettcher.

(9) 1773 to 1915.—Introduction of several so-called one minute tests in white, none of them central, Snellen

1873, Landolt 1888, Jackson 1891, Pergens 1893, Von Ammon 1901, Pergens 1909, McKinney 1915, Wolffberg 1915. Of these, that of Landolt, was selected as the standard visual test object by the International Ophthalmic Congress in 1909.

(10) 1910-1916.—Introduction of two central one minute tests in white, Wolffberg 1910, Ewing 1916.

(11) 1918.—Standardization of illiterate test objects by the Ophthalmic Section of the American Medical Association.

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VENESECTOMY AS A PREVENTIVE FOR EXPULSIVE HEMORRHAGE.

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In the case here reported this practical expedient was resorted to with complete success. Other points in the treatment of this case are also discussed in a way helpful to the practising ophthalmic surgeon.

The narration of the following experience may encourage, and perhaps guide some, to whom falls the unenviable task of extracting the remaining cataract, after the fellow eye has been lost by expulsive hemorrhage, that distressing catastrophe which happily occurs scarcely more than once or twice in an average ophthalmic surgeon's lifetime.

Mrs. C, aged 78, a patient of Dr. Kitchen of Parkstone, who had resided in Egypt and India most of her life, was subject to malarial fits, with high temperature, shivering, pains about the body and black fingers followed by perspiration. She had also a very pronounced myxedema with gout and chronic cystitis, so that expulsive hemorrhage was not to be wondered at, when her right cataract was extracted by one of the ablest and most esteemed of London surgeons, due of course to no surgical fault on his part. The bleeding commenced half an hour after extraction and continued for 2 days before the eye was enucleated.

It was his first case of such intra-ocular hemorrhage in a large experience, and he could not be persuaded to touch the other eye, in which there remained a cataract about three-fourths ripe, with a rigid iris, immobile to mydriatics. Feeling the greatest sympathy with him, and knowing that malarial affections of the choroid tend to be hemorrhagic, I was at first inclined to adopt a similar attitude, more especially as the patient retained vision of fingers at a yard, and there was still some clear cortex. The possibility of losing this sight and of plunging her into complete night and thus perhaps terminating her frail existence would have deterred me altogether, but for

the "happy thought" of making venesection the first stage of the operation. I did a preliminary iridectomy, which was followed by an acute attack of gout in the foot, with malarial temperature reaching 103.4 and fluctuating from day to day. However, it eventually yielded to quinin. Eight days after the temperature had fallen to normal, she was brought again to the Nursing Home for the extraction of the cataract. Every precaution I could think of was taken; the operation being done in her own bed to avoid any movement afterwards. After mercurial purging, milk diet, calcium lactat, and (the night before) aspirin for her gout, quinin for her malaria and thyroid for her myxedema, I also gave on the morning of the operation bromid and morphia, with a hot turpentine stupe for the bowels to draw the blood thitherwards. The feet were kept sedulously warm, her head being also raised in bed.

The most important measure of all, however, was venesection immediately before the operation. As the veins at the bend of the elbow were entirely lost in myxedematous swelling, I selected a large vein in front of the temple, and cut it across obliquely making it bleed freely. I also pricked the distended episcleral veins on the eyeball, and the hyperemia of the eye became visibly less. An interesting result of this was that on cutting the flap it was quite bloodless, although adrenalin had been dispensed with, to avoid the secondary hemorrhage to which it predisposes. The coagulability of her blood was found to be very poor.

It might seem rash to choose the intracapsular mode of extraction for such a case, but the lens looked so sticky, and the iris so vascular and rigid (with T+1) as to make me fear

that gouty cyclitis would be sure to follow the retention of any sticky cortex in the anterior chamber. Yet on the other hand the danger of retroocular hemorrhage is undoubtedly greater after intracapsular than after classical extraction. I had to balance the two dangers and decided for the latter. After inserting a preliminary suture, as I am often accustomed to do, I extracted the lens in its capsule without loss of vitreous, with the aid of my little lens loop described elsewhere, and tied the suture.

The object of the suture was to secure rapid healing and refilling of the anterior chamber, before the circulation could reassert itself, and to limit the hemorrhage should it occur. Finally, a gentle compressive bandage was applied. The eye healed uneventfully, and though in a day or two its former hyperemia returned, no hemorrhage took place and the success was complete. She obtained vision, after correction, of 6/9 seven weeks later, and could not refrain from tears of joy,

when, after so many anxious vicissitudes, she was first allowed to discover her return of sight. It was followed by a great improvement in health, and she may still be seen, nearly two years later, walking about the streets quite briskly, and to all intents ten years younger.

The very rigidity of the iris seems to have been an advantage, for the small coloboma retained its proper shape instead of being widened, as it so often is by intracapsular extraction. It is due to say that the unusual hazard of this operation (done on a dark New Year's morning, with the handicap of chillblained fingers) induced both the operator and his assistant to ask beforehand for help and it is pleasant to record the result.

Some of the hints, and especially the venesection, may be helpful to others confronted with similar difficulties, but the mode of extraction is narrated only as an incident suited to this special case, and not as a precedent to be lightly followed.

EXPERIMENTS ON THE EYE WITH GAS MANTLES OF DIFFERENT COMPOSITIONS.

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This paper reports experiments made with Welsbach mantles of known size and composition as to the effect of the light they furnish upon the loss of efficiency and discomfort caused by a certain amount of eye work done under such illumination, with a discussion of the significance of these results.

In a preceding paper (see this journal April 1918, p. 252) it was pointed out that a belief seems to prevail among laymen and not a few medical and technical men that the kerosene flame as a source of light possesses advantages for the eye not had by other illuminants, more particularly by the incandescent solids. In that paper results were shown comparative of the effect of the following filament lamps on the power of the eye to sustain clear and comfortable seeing: the carbon lamp (metallized filament), the Mazda type B lamp, the Mazda type

C lamp and the Mazda type C-2 lamp (blue bulb).¹ In the work of the present paper the comparative testing was continued. Welsbach gas mantles of different proportions of ceria and thoria were used, and the results obtained were again, for the sake of carrying out the original plan, compared with those gotten with the kerosene flame.

¹Trade definitions: Gas-filled, *daylight* (blue) glass incandescent lamp, Mazda, C-2.

Gas-filled, clear glass incandescent lamp, Mazda C.

Vacuum, clear glass incandescent lamp, Mazda B.

The Welsbach mantle is an interesting illuminant from the standpoint of the effect on the eye, because of the change in its selectiveness of radiation with change in composition of the mantle. That is, by changing the proportions of ceria and thoria in the mantle a light can be obtained with its dominant color ranging from blue-green thru green, yellowish green, clear yellow and orange. The maximum candle power is obtained around 0.75 per cent ceria and 99.25 per cent thoria. The light from this mantle is an unsaturated yellowish green. With an increase of ceria the dominant color shifts towards that of the long wavelengths; with a decrease of ceria, towards that of the short wave-lengths.

The direct incentive to the following experiments was a request made by certain members of the Illuminating Engineering Society, connected with the gas industries, that we test the effect of two mantles represented to us as commercial. Certain differences in effect were obtained. As a result a series of mantles was made for us, under their direction, to determine the effect of varying the proportions of ceria and thoria. We had no responsibility for planning the series, nor for arranging the details of the installation and operation of the units. All such matters were taken care of by them. The tests were made under their direction and all of the conditions from their side and ours were inspected before and during the course of the work, to see that justice was done. At the end of the work when all of the results were in, another inspection was made and conference held. The opinion was given that the tests had been conducted under fair conditions. The desire was expressed that the experiments be extended to include the testing a large number of observers as diversely selected as possible.

CONDITIONS TESTED.

The illuminants used in this series were the kerosene flame; two shortened "Ramie" Welsbach mantles, single mesh weave—one with 0.7 per cent

ceria and 99.3 per cent thoria, the other with 2 per cent ceria and 98 per cent thoria; and seven "Ramie" Welsbach mantles, single mesh weave, of the size known as Junior mantles, having 0.25 per cent ceria and 99.75 per cent thoria. 0.5 per cent ceria and 99.5 per cent thoria, 0.7 per cent ceria and 99.3 per cent thoria, 1 per cent ceria and 99 per cent thoria, 2 per cent ceria and 98 per cent thoria, 3 per cent ceria and 97 per cent thoria and 5 per cent ceria and 95 per cent thoria.

For the sake of comparison with the kerosene flame, it might have been desirable to have conducted the tests with the gas illuminants equal to it photometrically, or approximately so, as well as with an equally illuminated reading page and test object. This was, of course, impracticable with the Junior mantles. To serve as a check on this factor, however, two of the mantles, the ones most commonly used, were shortened. They were cut to a length of 1.5 inches in order to make them as nearly as possible of the same candle-power as the kerosene flame burning at a height of 3 inches. Since the light from the top of the mantle differs in color value from that emitted from the middle and lower parts, this shortening of the mantle caused a change in the color value of the total flux of light. The effect of this change on the coloration of the reading page was quite noticeable. For example, in the mantle having 0.7 per cent ceria and 99.3 per cent thoria, steadiness of pressure and freedom from flicker in the light emitted were secured by means of a Baylis low pressure automatic governor, weighted to give 0.25 inch water pressure. A further means of regulating the flow of gas and making small changes of pressure, if needed, was provided by inserting a gasoline needle valve directly beneath the Bunsen burner.

The same standard, one burner student lamp fixture, fitted with a gas burner, a dummy chimney, etc., was used as was employed in the preceding experiments. We were led, it will be remembered, to choose this particular

type of unit in part because the belief in the superiority of the kerosene flame for the eye is, in the minds of those we have questioned, associated largely with the lighting effects given by the student lamp; and in part because this lamp is well adapted to give the control of conditions under which we wish the first series of tests to be made. Care was taken to adjust the position of the shade so that it sustained in each case approximately the same relation to the mantle. The bottom of the shade was, for example, in all cases 25 cm. below the center of the luminous source. The lamp was placed behind and to the left of the observer in the position that was judged by several observers to give the conditions most favorable for reading. This position may be specified roughly as follows. The angle with the median plane of the observer made by a plane passing vertically thru the center of the unit was approximately 21 degrees; and the line in the latter plane connecting the bottom of the shade with the center of the reading page formed an angle of approximately 38.5 degrees with the horizontal plane passing thru the center of the reading page. The reading page was supported by a rack fastened to the upright to which was attached the mouth-board used by the observer in taking the 3-minute record before and after work. This rack was inclined at an angle of approximately 30 degrees with the vertical. To insure that the same amount of light fell on the reading page in each case, the brightness of the page was measured before and after work by means of a Sharp-Millar illuminometer with the test plate removed and calibrated to give readings directly in candle-power per square inch. The changes needed to give equality of illumination on the reading page were made by changing the distance of the lamp from the page. These changes in case of either the full length or the shortened mantles were small. The changes required, however, to equalize the full length with the shortened mantles were slightly greater. This means a slightly greater general illumination of

the observer's field of view and a slightly different brightness of surroundings. That is, the mantles of higher candle-power placed at a greater distance from the reading page illuminated a larger field about the page than the mantles of lower candle-power. In making the changes of distance care was taken to keep the angle at which the light fell on the page in all cases the same.

Owing to the angle of direction of the light and the distance of the lamp, the test object had to be illuminated from a separate source. For this a Mazda, type B lamp and an Ivanhoe-Regent steel reflector of the intensive type, aluminum lined, were used, placed in front and to one side of the test object, at the distance and angle needed to give the required illumination. In order that the test object alone should be illuminated and not the surrounding wall, objects, etc., the opening of the reflector was covered and an oblong aperture was cut of the size and shape needed to give the desired cross-section of light. The position of this aperture in the opening of the reflector was chosen with reference to giving the greatest possible evenness of illumination of the test object. That is, the light was not taken directly from the lamp but from the most favorable part of the inner surface of the reflector. The test object was made to match the reading page both in brightness and color value. The match in color value was secured by means of thin gelatin filters covering all or part of the aperture. If only a part of the aperture was covered, the filter was used as a diaphragm with an opening similar in shape to the original aperture. There was, for example, enough difference in the color value of the different illuminants and the Mazda lamp that without this match an after-effect was given on the test object distinctly different in color from the reading page. This would have necessitated that the final 3-minute record be taken in part at least with a test object having a coloration complementary to the reading page, which

would not have been compatible with the purpose of the test. Before beginning each test of the series, the eye was allowed the customary adaptation period without work under the illumination to be tested. The choice of the length of adaptation period was empirical based on a series of acuity tests, the object being to determine a period the prolongation of which gave no further change in acuity.

As was the case in the former experiments an opaque shade of the same size and design and with a neutral lining was substituted for the green shade with which the student lamp is usually provided. That is, it was considered advisable to conduct the test with the color value proper to the illuminant, unmodified by the light which filtered through the shade even though the position of the lamp was such that a very small part of the light which fell on the reading paper was of this origin.

The reading page illuminated by the different light sources had the following color values: the kerosene flame, orange-yellow; Welsbach mantle, 3 per cent ceria, 97 per cent thoria, unsaturated, clear yellow; Welsbach mantle, 5 per cent ceria, 95 per cent thoria, reddish-yellow more saturated; Welsbach mantle, 2 per cent ceria, 98 per cent thoria, unsaturated yellow with a trace of green; Welsbach mantle, 1 per cent ceria, 99 per cent thoria, unsaturated yellow with more green; Welsbach mantle, 0.7 per cent ceria, 99.3 per cent thoria, unsaturated yellowish green; Welsbach mantle, 0.5 per cent ceria, 99.5 per cent thoria, greenish with perhaps a trace of yellow; Welsbach mantle, 0.25 per cent ceria, 99.75 per cent thoria, bluish green. These estimates of color value are based in part on a direct comparison with color standards, in part on the filters that had to be used to make the color match between the test object illuminated by the Mazda type B lamp and the reading page lighted by the illuminant to be tested. We have not as yet made a standard colorimetric or spectro-photometric determination.

The tests were conducted in a room

16 ft. 6 in. (5.03 m.) long, 11 ft. 9 in. (3.58 m.) wide, and 9 ft. 6 in. (2.93 m.) high. A photograph of the room with an observer, lamp and recording apparatus in position are shown in Fig. 1 of the preceding paper, this Journal, April 1918, p. 254. The recording apparatus and the fixtures for lighting the test object were, as before, screened from the observer's view.

For a detailed statement of the care that has been exercised in the selection and use of observers and the precautions that have been taken to secure reproducibility of results and to check up the influence of variable extraneous factors by means of careful determinations of the mean error of the observations both in the 3-minute records and the 3-hour tests under the several conditions, see pp. 255-257 of the preceding paper; also Transactions of the Illuminating Engineering Society, 1915, X, pp. 1122-1130 and various places in other preceding papers.

The results for the effect on the eye are given in Table I. The values given in this table are averaged in each case from the results of a number of three hour tests. In order to show the reproducibility of the results obtained and to determine whether the variations produced by the changes in lighting effects are safely in excess of the variations in the test itself, subject to all of the variable factors which may influence it, the mean variation from the average result has been computed in each case. The value of these in per cent is given in columns 12 and 13 in Table I. This value has been estimated in two ways. In column 13 it is based on the result sought, namely, the mean value of the drop in ratio of time seen clear to time seen blurred. Computed in this way the results indicate whether or not each individual determination has been made with an acceptable degree of precision as compared with other work of its class. In column 12 it is based on 3.5, the value of the ratio of time clear to time blurred which has been chosen empirically as the standard of performance of the eye in the 3-minute record be-

fore work. Computed in this way the results appear in a form from which it can readily be determined whether or not the work has been done with a degree of precision which is acceptable for the comparative work which is the special purpose of these experiments. That is, to be acceptable in this regard, the variations of the drop in ratio caused by changing the conditions to

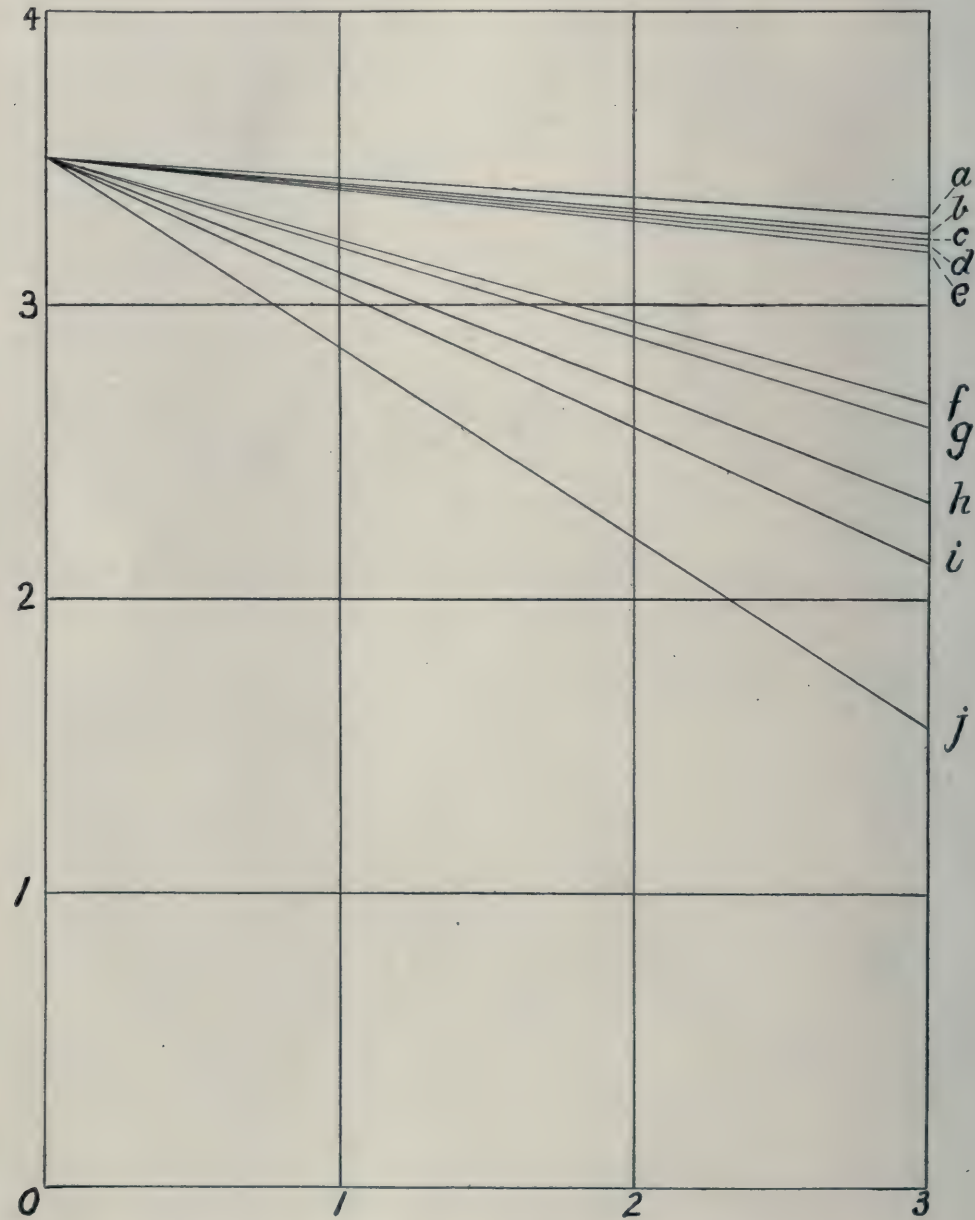


Fig. 1. Tendency of different illuminants to cause loss of visual efficiency (Figures on left) in three hours (Figures at bottom): (a) 3% ceria, 97% thoria. (b) 5% ceria, 95% thoria. (c) 2% ceria, 98% thoria. (d) kerosene flame. (e) Short mantle, 2% ceria, 98% thoria. (f) 1% ceria, 99% thoria. (g) short mantle, 0.7% ceria, 99.3% thoria. (h) 0.7% ceria, 99.3% thoria "Junior mantle." (i) 0.5% ceria, 99.5% thoria. (j) 0.25% ceria, 99.75% thoria.

be tested, must in each case be safely in excess of the mean variation. To make this comparison convenient, the drop in ratio and the mean variation have both been estimated on the same base, 3.5.

In Fig. 1 a graphic representation is made of the results in Table I. In constructing this chart, the total length of the test period is plotted along the

given in previous papers. The results are given in Table II. In this table are given also for the sake of comparison results expressing the tendency of each type of illuminant to cause loss of ability to sustain clear seeing. A graphic representation of the results of Table II are given in Fig. 3. Here as in Chart A the results of the test are plotted against composition of mantle.

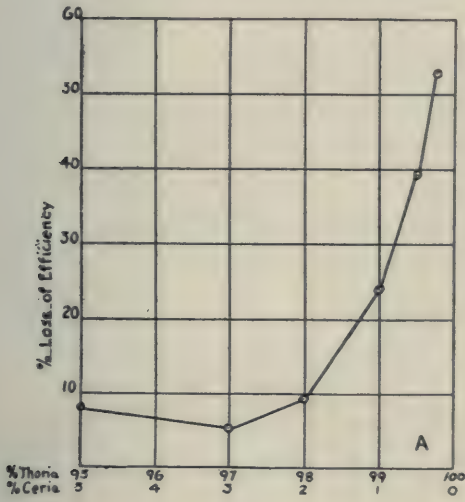


Fig. 2.

Showing a comparison of the tendency of the different illuminants to cause loss of visual efficiency, or power to sustain clear seeing and to produce ocular discomfort. In Fig. 2 composition of mantle is plotted against loss of efficiency; in Fig. 3 against the tendency to produce discomfort.

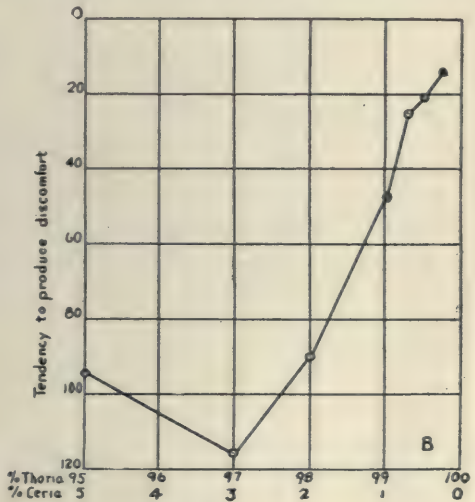


Fig. 3.

abscissa and the ratio of the time the test object is seen clear to the time it is seen blurred is plotted along the ordinate. Each one of the large squares along the abscissa represents one hour of the test period; and along the ordinate an integer of the ratio. In Fig. 2 a composition of mantle is plotted against loss of efficiency or power to sustain clear seeing expressed in per cent; Fig. 3 against tendency to produce discomfort. The results for the shortened mantles are not represented in these charts.

As formerly the work was concluded by determining for the different illuminants used the relative tendencies to produce discomfort with the eye at work. A description of how the determinations were made and a discussion of the method that was used have been

COMMENTS.

(1) That the foregoing results are due to differences in the color value of the illuminants used is perhaps a natural inference. This inference is strengthened further by a comparison of the results obtained in this and the work of the former paper on the electric units. However, a question may be raised whether they are due to color value alone. The conspicuous variables in these experiments have been composition of light (a physical variable) and color value (a sensation variable). It is scarcely needful to point out that, while closely related, these two variables are not synonymous nor do they always go hand in hand. For example, white light, so far as sensation is concerned, may be produced in any of the following ways: (a) by

TABLE I.
Showing the tendency of the different illuminants to cause loss of visual efficiency or power to sustain clear seeing.

Type of Illuminant	Dominant Color	Brightness (Cd. per sq. in.) Test object	Time	Working dis- tance (cm.)	Total time clear (sec.)	Total time blurred (sec.)	Total time clear + total	Ratios reduced to common standard	Loss of efficiency expressed in per- centage change of ratio	Based on 3.5	Mean variation (Per cent)
Welsbach mantle, 3% ceria, 97% thoria	Unsaturated, clear yellow	0.003168	0.003344 9 A.M. 12 M.	58	140.0 138.25	40.0 41.75	3.50 3.31	3.50 3.31	5.43	0.286	5.26
Welsbach mantle, 5% ceria, 95% thoria	Reddish - yellow, more saturated	0.003168	0.003344 9 A.M. 12 M.	58	140.0 137.50	40.0 42.50	3.50 3.235	3.50 3.235	7.57	0.2257	2.98
Welsbach mantle, 2% ceria, 98% thoria	Unsaturated yellow with trace of green	0.003168	0.003344 9 A.M. 12 M.	60	144.0 141.50	36.0 38.50	4.00 3.67	3.50 3.21	8.29	0.390	4.69
Kerosene flame	Orange yellow	0.003168	0.003344 9 A.M. 12 M.	60	139.17 136.33	40.83 43.67	3.408 3.122	3.50 3.2063	8.39	0.323	3.84
Welsbach mantle, 2% ceria, 98% thoria (shortened)	Unsaturated yellow with trace of green	0.003168	0.003344 9 A.M. 12 M.	60	142.40 139.70	37.60 40.30	3.787 3.466	3.50 3.2033	8.48	0.3828	4.52
Welsbach mantle, 1% ceria, 99% thoria	Unsaturated yellow with more green	0.003168	0.003344 9 A.M. 12 M.	60	141.0 132.0	39.0 48.0	3.62 2.75	3.50 2.66	24.00	0.571	2.38
Welsbach mantle, 7% ceria, 99.3% thoria (shortened)	Unsaturated yellowish- green	0.003168	0.003344 9 A.M. 12 M.	60	139.33 129.33	40.67 50.67	3.426 3.552	3.50 2.607	25.51	0.250	0.97
Welsbach mantle, 7% ceria, 99.3% thoria	Unsaturated yellowish- green	0.003168	0.003344 9 A.M. 12 M.	60	139.50 125.50	40.50 54.50	3.444 2.303	3.50 2.34	33.14	0.860	2.59
Welsbach mantle, 5% ceria, 99.5% thoria	Greenish (perhaps trace of yellow)	0.003168	0.003344 9 A.M. 12 M.	60	142.0 125.0	38.0 55.0	3.737 2.273	3.50 2.13	39.14	0.857	2.19
Welsbach mantle, 25% ceria, 99.75% thoria	Bluish-green, more saturated	0.003168	0.003344 9 A.M. 12 M.	60	142.35 113.50	37.65 66.50	3.781 1.707	3.50 1.58	54.86	0.690	1.25

TABLE II.

Showing a comparison of the tendency of the different illuminants to cause loss of visual efficiency and to produce ocular discomfort. The tendency to produce discomfort is estimated by the time required for just noticeable discomfort to be set up.

	Dominant Color	Brightness (Cp. per sq. in.) Reading page	Percent loss of efficiency	Mean variation (Percent)	Time threshold of discomfort in sec- onds (reading)	Mean variation (Percent)	Change produced by changing type of illumi- nant (Percent)
Welsbach mantle, 3% ceria, 97% thoria	Unsaturated yellow	0.003344	5.43	0.286	116.0	1.30	
Welsbach mantle, 5% ceria, 95% thoria	Reddish-yellow, more saturated	0.003344	7.57	0.2257	94.0	1.07	18.97
Welsbach mantle, 2% ceria, 98% thoria	Unsaturated yellow, with trace of green	0.003344	8.29	0.390	90.0	0.83	4.26
Kerosene flame	Orange-yellow	0.003344	8.39	0.323	90.0	0.55	0.0
Welsbach mantle, 2% ceria, 98% thoria (shortened)	Unsaturated yellow, with trace of green	0.003344	8.48	0.3828	90.0	0.55	0.0
Welsbach mantle, 1% ceria, 99% thoria	Unsaturated yellow, with more green	0.003344	24.0	0.571	48.0	1.04	46.67
Welsbach mantle, .7% ceria, 99.3% thoria (shortened)	Unsaturated yellow- ish-green	0.003344	25.51	0.250	34.0	2.94	29.17
Welsbach mantle, .7% ceria, 99.3% thoria	Unsaturated yellow- ish-green	0.003344	33.14	0.860	25.0	2.00	26.47
Welsbach mantle, .5% ceria, 99.5% thoria	Greenish (perhaps trace of yellow)	0.003344	39.14	0.857	21.0	3.50	16.00
Welsbach mantle, .25% ceria, 99.75% thoria	Bluish-green	0.003344	54.86	0.690	14.0	2.36	33.33

combining complementary spectrum bands; (b) by combining larger groups of complementary wave-lengths; (c) by combining all of the wave-lengths in proportions balanced for the eye; and (d) by raising to very high intensities lights of any composition. Further any one who is familiar with the phenomena of color mixing knows that lights of different composition may be sensed of the same hue and saturation. Would white light of different compositions have the same effect on the power of the eye to sustain clear and comfortable seeing? Similarly would the eye stand up equally well under colored lights of the same hue and saturation but of different compositions? We would point out that daylight in reaction to which, roughly speaking, the human eye has developed, is what might be termed a full spectrum light. Would the eye sustain its functional powers as well and as comfortably under every light which matches it in color value even though synthesized from complementary spectrum bands or larger groups of complementary wave lengths? We are not at present prepared to say. It is safe to

conclude, however, that they would not be of equal service for color matching, nor is it reasonable to suppose that they would be of equal value for the varied purposes of seeing. The same, we think, might be said of mixed colored lights matching in hue and saturation but differing in composition. If a decision is wanted as to the relative effect of color value and composition of light the results should be correlated with both of these variables. Since we are not prepared at this time to give a distribution curve for each of the mantles used, we have preferred to plot the results against composition of mantle, leaving a decision as to factors an open question.

(2) Differences in composition of light may, it is conceivable, affect the power of the eye to sustain clear and comfortable seeing in any or all of the following ways: (a) They may affect the resolving power of the eye. Experiment has shown that spectrum lights give a higher visual acuity than mixed lights of the same color. It seems quite possible also that variations in the composition of mixed colored lights may affect the sharpness

of focusing. (b) They may exert an immediately deleterious or irritating action on the delicate structures of the eye. For example, before beginning the work on the different illuminants we had planned a series of experiments on composition and color value of light, using 100-watt lamps, Mazda, type B, dipped in red, yellow, green and blue dyes, indirect installation. The coating of the lamps was sufficiently dense to give walls, ceiling, reading page, etc., of strongly saturated colors. The green was used first. After an hour of exposure to this light the eyes had suffered severely. The sclera had become injected and so much discomfort was experienced that the plan of using saturated colors was for the time being abandoned. So trying was the experience that some time had elapsed before the eyes had regained their normal appearance and comfort. The red, at a later trial was worse than the yellow but not so bad as the green.¹ The blue has not yet been tried. (c) They may have an effect on acuity thru the color of the sensation aroused. The reading of black letters on a page which presents any considerable degree of coloration is a peculiarly baffling experience. There is an unclearness which is not the blurring of bad focusing or of faulty fixation, but which seems to be a matter of ease, or rather the lack of ease, with which the details of the retinal picture are discriminated. Unclearness or difficulty of discrimination, from any cause whatsoever, leads reflexly to muscular effort towards a corrective readjustment which of course in the cases under consideration comes to naught and only induces fatigue.

(3) In general, if one were willing to draw conclusions with regard to

composition and color value of light at this stage of the investigation, he would be inclined to say that in case of a given color the power of the eye to sustain clear and comfortable seeing decreases with the saturation of the color; but that independent of saturation some colors affect the eye more than others, namely, a displacement from white towards a dominance of the short wavelengths of the spectrum affects the eye more than a similar displacement towards the long wave-lengths. For example, a yellowish or reddish yellow light affects the eye less than a greenish yellow, a green or a blue green of equal or even lesser saturation.² For the sake of confirming the above results it is our purpose to extend the work to include the testing of the effect of these variations in color obtained in other ways.

(4) In considering the relative merits of illuminants the comparatively low surface brilliancy of the gas mantle should not be forgotten. This fact is of a great deal of practical importance in the problem of providing adequate shading for the eye.

(5) In connection with the problem of shading we would recommend that the 0.75 per cent ceria mantle and other mantles of low ceria content be used with shade so selected that its color effect is corrective of the greenish coloration of the light given by these mantles. An examination of sales' reports shows that there is a growing popular tendency to use the "Standard" Welsbach mantle with an amber shade. The amber shade should exert in some measure a corrective action on the greenish light of the "Standard" mantle and is according to our results a movement in the right direction so far as the hygiene of the eye is concerned.

¹The greater tendency of green to produce discomfort than yellow, reddish yellow and red has been reported also by different observers in our laboratory, working on problems involving long exposures of the eye to spectrum lights. However, we are far from denying the possibility of individual differences in this regard.

²As might be expected, our best results thus far in the testing of illuminants have been obtained with daylight. By this we mean natural daylight, not any of the attempts to simulate daylight artificially. In this latter connection our results with the type C-2 Mazda lamp may be called to mind.

ROLE OF FOCAL INFECTIONS IN SYMPATHETIC OPHTHALMIA.

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This paper sets forth an hypothesis of the connection of focal infections with sympathetic ophthalmia, cites the writings of others that seem to support this view, and reports in abstract five illustrative cases. Read before the Pacific Coast Oto-Ophthalmic Society, August 6th, 1919.

The object of this paper is to call your attention to a possible relation between certain cases of sympathetic ophthalmia and focal infection notably of the apices of the teeth, the so-called apical abscesses.

The resemblance of certain of these cases is so close to certain other cases of serous iridocyclitis with focal infections as an admitted etiologic factor, that I am unable to see any substantial difference between them except the history on the one hand of a perforating injury of one eye preceding by a certain interval of time the outbreak in the second eye, and on the other hand the absence of such history.

I desire to place before you a working hypothesis of the pathogenesis which is based upon the work of many ophthalmologists and which, while it recognizes the etiologic rôle of focal infections in the production of sympathetic ophthalmia, gives a different evaluation to anaphylaxis from any I have been able to find in the literature accessible to me.

I submit the following sequence of events as enabling us to understand and explain the occurrence and course of sympathetic ophthalmia. It is of course hypothesis, not a statement of settled pathology.

First. A focal infection.

Second. A trauma of the eye with microbic implantation in the uveal tract of bacteria similar to those in the focal infection, or of a variety which by change, in oxygen pressure for example, may by transmutation become similar.

Third. A time interval during which sensitization of the uveal tract occurs.

Sensitization by (a) Local specific defense by first a zymogen with specific ferment and a splitting of the bacterial protein in the exciting eye. (b) Predilection for the uveal tracts.

Fourth. Escape "in sufficient numbers" into the circulation of bacteria either from the first eye or from the focal infection.

Fifth. After sensitization a continuous or intermittent supply of bacterial protein of the same sort which has sensitized the second eye, causing an anaphylactic inflammation by a process somewhat analogous to Arthus's phenomenon, but not the same.

To those of us not familiar with Arthus's phenomenon this abridged description gives the principal points.

If a rabbit is sensitized by the subcutaneous injection of horse serum every six days, the first few injections will be absorbed in a number of hours. The fourth injection produces a soft infiltration which is not absorbed before two or three days. The fifth injection causes an edematous infiltration which is harder and is not absorbed before five or six days. The sixth injection produces a white solid compact subcutaneous mass which persists for weeks and the seventh causes the skin over the subcutaneous mass to become red then pale and begins to dry, a spot of gangrene develops which produces a refractory ulcer. These results remain the same when the injections are given in different localities or when all but the last are given in different localities or when all but the last are intraperitoneal.

Sixth. Sensitization of the second eye, having occurred thru and by reason of predilection the antigen, to use Ehrlich's term, could come conceivably either from the focal infection or from the exciting eye which would suggest the necessity for removal of both the exciting eye and the focal infection and which moreover would explain why removal of the exciting eye alone has failed so sadly to save the

sympathising eye once the uveitis has become established.

Taking this sequence of events seriatim: Billings defines a focal infection as a circumscribed area of tissue which is the seat of an infection of pathogenic microorganisms.

Such an area as you know may be located nearly anywhere in the body. If primary it usually communicates with a mucous or skin surface. It may spread by contiguity or become secondary thru the blood or lymph channels. The eyeball itself may become either a primary or secondary focus, as, for example, in a panophthalmitis following a wound or a metastatic choroiditis; and as such itself disseminate bacteria and toxins, having a perfect predilection for ocular tissues.

The effects of a focal infection depend upon whether or not the pyogenic or nonpyogenic bacteria are present, also upon the location and therefore upon the successful local defense set up by the contiguous tissues. If the degree of success in erecting a wall of exudate about the focus is small there will be leakage, either of toxins or of bacteria or of both, into the circulation with results of course dependent upon the virulence and number of the bacteria, as well as upon the particular affinities of the strain, if it be streptococcus or pneumococcus, etc.

Bearing these pathologic considerations in mind let us then assume for the present the presence of a focal infection; for example, an apical abscess with streptococcus viridans as the invader. We might substitute a tonsillar crypt with streptococcus mucosus capsulatus if we choose.

The patient says he is perfectly well, feels no pain or tenderness about the tooth. The toxins and the streptococci are nevertheless leaking into the circulation either continuously or intermittently and of course may reach the uveal tract.

Why does not the patient invariably develop an iridocyclitis? Because among other things both the streptococci and the toxins are insufficient in number and virulence to get by the nonspecific defenses of the blood.

Moreover the strain of streptococci may have no special affinity for uveal tissues, furthermore the bacteria may be insufficient in numbers to cause any local specific defense by the uveal tissues.

Assume now the implantation in the uveal tissue thru a wound in one eye of a sufficient number of streptococcus viridans to set up an inflammation. If not in sufficient number or of sufficient virulence suppuration will not occur, but a so-called traumatic inflammation of greater or less degree. This inflammatory reaction is accompanied by leucocytic infiltration and the well known histologic changes. This histologic picture is not that of sympathetic ophthalmia.

If this eye, having been infected with streptococci, is inflamed a specific defense *in loco* is set up with leucocytic infiltration, and formation of a specific proteolytic ferment which splits the protein of the streptococcus (and probably its toxins).

The fixed cells of the uvea participate. They are sensitized, being rich in the specific proteolytic zymogen, or to use the language of Billings, the streptococci have a "specific elective pathologic affinity for the tissue," or else no resistance would have been encountered. If they were in sufficient number, therefore, the invader "excited a characteristic reaction and sequential train of morbid anatomic lesions."

Rosenow has been able by varying the oxygen pressure of his cultures to cause transmutation from streptococcus hemolyticus to pneumococcus, to mucous capsulatus, to viridans, also to change the virulence and elective affinities almost if not quite at will.

I assume such change is possible in an eye, i. e., that a strain having predilection for uveal tissue may be produced in one eye which will affect the other. What determines the production of such a strain I do not know. However Vaughan says "each foreign protein has its predilection tissue where it is largely deposited, whose cells it especially sensitizes and where it is disrupted."

This requires *time*. After a time in-

terval, injection of more of the foreign protein into a sensitized tissue will set up an anaphylactic reaction. What an anaphylactic inflammation in the eye is like we shall see presently.

Streptococci, or other bacteria escaping into the circulation, having an elective pathologic affinity for uveal tissue, escaping from the first eye, find their mother tissue nowhere else but in the second eye; they are there deposited, having been found in sympathetic ophthalmia by Angelucci, Limbourg, Levi and others. They especially sensitize the uveal tissue of the second eye. If now the supply is augmented by a supply from a second similar focus elsewhere in the body the conditions are met for an anaphylactic reaction if the numbers, and virulence and predilection are only sufficient. Conditions which we might believe to be rather rarely all fulfilled at one time and that the proper time.

So far much has been assumed, possibly on good grounds. Now let us lay aside assumption for a time and use facts.

Wibaut (*loc. cit.*) has produced, by anaphylactic means a nodular choroiditis, with lymphocytes and giant cells resembling the deposits in sympathetic ophthalmia. The method used was to inject freshly sterile horse serum into the vitreous of rabbits, and this produced no especial reaction. After a time interval of some fourteen days he injected intravenously a second dose of horse serum. This second injection was always followed immediately by a severe iridocyclitis.

Enucleation of the eye, after from twenty-four hours to three days, showed the appearance just mentioned, epithelioid lymphocytes and giant cells.

Following are some clinical facts in the histories of five cases, two of which met the classic diagnostic requirements for sympathetic ophthalmia.

CASES.

CASE 1:—H. R., planerman in box factory, age 37, first seen March 16th, 1912. Complained of blurring of his right eye, worse by artificial light, past ten days.

History:—Penetrating injury of left eyeball with gradual change in left eye since. Often red of late. Right eye began to blur about ten days or two weeks ago, constant now, no attacks of transient blurring or asthenopia before. Is recovering from a "cold" in the head with "crick" in the back of the neck (i. e. muscular rheumatism), no intolerance of light, no pain about the eye, no headache.

Present condition:—Vision 8/10 and J 1 at 15 cm. *right* eye, pericorneal injection, violet color, perforating vessels tortuous, dilated, dark colored, slight swelling of both upper and lower eyelids due, he says, to the "cold." Anterior chamber hazy, keratitis punctata. Posterior synechia. Pupil horseshoe shaped after atropin. Pigment cells on anterior capsule. Anterior portion of vitreous full of small opacities, no fundus details, reflex only, eyeball tender to pressure.

Left eye:—Phthisis bulbi, injection of bulbus, left eyeball tender also.

Diagnosis:—Plastic iridocyclitis, probably sympathetic. He was given local 1% atropin sol., one drop every four hours with hot fomentations.

March 18th, second day, he returned with irregular dilated pupil, showing dust like opacities over entire pupillary area, vision=8/13, enucleation of left eye advised. March 29th he returned with a note from Dr. Stillson to whom I had referred him on the 16th, confirming the diagnosis of sympathetic ophthalmia and advising enucleation which was accepted and performed at Minor Hospital March 30th, 1912. The enucleated eyeball showed a plastic inflammation. Tenonitis of recent date. Was not examined histologically.

April 26th, vision = 8/10 with cycloplegic skiascopy +1.50 and +1.25 not improved. April 28th, vision=6/6, June 1, 1912, vision = 8/6, patient very happy. Returns to work. Pigment dots on capsule still visible. Dec. 16th, 1913, conjunctivitis, vision = 8/8-1, argyrol. February 27th, 1915, thinks he is luetic. Wassermann negative. Sept. 16th, 1915, has been under antiluetic treatment since Feb. 27th. Sight is good, vision = 6/5, some vitreous haze but papilla fairly

clear. Excavation of papilla —5.00 D.

April 4th, 1917, vision impaired past week, V = fingers at two meters, atropin and dionin, X-ray of alveoli shows abscesses and pyorrhea, three or four teeth extracted. His dentist confirmed X-ray findings, saying that granulomas were present in one or two pus sacs. June 4th, under vigorous treatment vision cleared, can see spots of fundus thru vitreous haze, vision = 6/20. December, 1918, another attack of pericorneal injection, vision = fingers about two meters, X-ray shows apical abscess, tooth extracted, eye cleared up, vision = 6/13, remains comfortable and looks so at present, April, 1919. July, 1919, fundus easily seen, vision = 6/5.

CASE 2:—D. V. McE. Right eye injured by flying piece of steel which penetrated the eyeball, passing thru the cornea and lens, and was extracted by Dr. Würdemann thru the original wound of entrance. Following this a severe uveitis supervened, great pain but no plus tension. On account of atropin conjunctivitis Dr. Würdemann changed to scopolamin, the pain becoming violent, according to Dr. Würdemann, because of the inert scopolamin.

The patient asked for consultation and was turned over to me by Dr. Würdemann. I suggested radiography of his teeth which was accepted. Two apical abscesses were found together, with much pyorrhea and alveolar abscesses. The teeth were extracted, whereupon the violence of the pain began at once to subside and the eye gradually cleared up.

Examination of the right eye showed a 4 mm. scar in the pupillary area of right cornea, adherent band of lens capsule extending back to the pupillary border of the iris. The anterior chamber was hazy, the iris markings obscured, pupil slightly dilated; there was some punctate keratitis, injection of the entire conjunctiva, all three sets of vessels. Tension —1, eyeball very tender and much lachrimation and pain in, above and behind eyeball.

Left eye:—Pupil contracted, some violent pericorneal injection, eye intolerant of light, not especially tender, no sat-

isfactory examination of the fundus could be made in either eye at this time, attempts at accommodation were painful and avoided by the patient, but when attempted caused left eye to become red and suffused with tears. No keratitis punctata or hazy anterior chamber in the left eye, tension normal to palpation. Eyeball not tender to touch. Diagnosis right eye, traumatic plastic uveitis. Left eye sympathetic irritation. This diagnosis was concurred in by Dr. Würdemann. Shortly afterward the patient was examined by a representative of an insurance company, who strongly advised enucleation of the exciting eye. This I declined to accede to until the results of treatment of the apical abscesses could be observed, these results being favorable. Local treatment was instituted by atropin, dionin and hot fomentations with alkalis internally. Fischer's solution by Murphy drip enema, also $ZnSO_4$ on account of Morax diplobacillary infection which was present, followed after a short interval with subconjunctival injections of .5% dionin solution. The eye cleared up, the left gradually ceased to water and the man returned to work.

Feb. 10th, 1919, vision right eye 6/20 with +10.00. Vision left eye 6/4 with +1.00 \ominus —0.37 cy. ax. 45. September 1, 1919, V. = 6/4 with correction. Eyes clear and comfortable.

This case is reported because I believe it shows the sort of case which will develop sympathetic uveitis if the local infection is not removed. I believe with the insurance examiner that this patient's left eye would have developed sympathetic ophthalmia in the ordinary course of events. Of course I cannot prove it.

CASE 3:—Reported only to show presence of a severe type of focal infection running concurrently with sympathetic ophthalmia. L. D. H., age 35, penetrating injury of right eye, January, 1916, followed by severe uveitis. After three weeks the eye was enucleated to save the left eye which was already the seat of a rather severe inflammation. This inflammation did not subside entirely after enucleation of the exciting eye, but continued a low grade uveitis. In order possibly to put a stop to this an iridectomy

was done in November, 1917, by Dr. Mattice, after which the eye was very sore and much inflamed for two months.

During the absence of Dr. Mattice in France I saw this patient, who at that time, July 29th, 1918, had plastic uveitis, the coloboma was filled with a whitish inflammatory exudate, *occlusio pupillae* also, vision = light perception? Tension —3; His mouth was very septic with a virulent pyorrhea which he said had been getting gradually worse the past two or three years. I believe early attention to this man's mouth would have saved his eye with vision.

CASE 4:—March 31st, 1917, Mrs. R. H., age 50, ocular history negative until three years ago, when right eye began to be inflamed, diagnosed as tuberculosis of cornea by a general practitioner, and treated for two years by tuberculin injections O. T. The inflammation gradually disappeared leaving the eye useless; vision light perception. Careful search by a competent internist now fails to show any evidence of present active tuberculosis. The right eye became somewhat inflamed again but no pain in it or headache. This inflammation, she states, is now gone, but three weeks ago the left eye began to be red and the sight to fail; some intolerance of light but no pain or headache. Examination of right eye shows slight pericorneal violet haze. A massive leucoma covers the lower three-fourths of the cornea. Thru the fairly clear portion, above, the pupil can be seen to be secloded. It resists atropin dilation. Iris markings not clear, some tenderness of the globe. Tension —1.

Left eye, injection of bulbar conjunctiva, slight edema of eyelids. Posterior annular synechia, which resists atropin dilatation, anterior chamber hazy; keratitis punctata, tension —2.

April 2, Clover leaf pupil, anterior chamber slightly clearer. Examination of mouth shows much bridgework and gold crowns. X-ray advised, but not accepted until April 7th, when the accompanying radiographs were made. Because she had just paid a \$70.00 old dental bill she could not afford to have the teeth extracted she said, but after thinking it over she decided to do so. By June 5th,

under dionin and atropin her descemetitis was slowly clearing, all her upper and two lower teeth were extracted. Inunction of lanolin hydrarg. 50%, hot fomentations and a course of subconjunctival injections of 5% dionin, brought about a gradual recession of the inflammation with slight improvement in vision.

About this time she began to develop an increasingly bitter opposition to the war program of the United States which caused her to seek other medical advice than mine, so that I lost track of her. This case fulfills the classic diagnostic requirements for sympathetic ophthalmia without trauma yet I cannot bring myself unreservedly to such a diagnosis. I feel that it was simply a case of double iridocyclitis, first one eye and then the other, produced by her focal infections.

CASE 5:—Mrs. B. April 3, 1916. Practice of Dr. Geo. W. Swift. She began to develop cataract in both eyes in 1910. In Sept., 1915, her left eye was operated on by Dr. MacWhinnie, three months later an iridocyclitis developed which destroyed the left eye. Urine negative, pulse slightly irregular. She has an arthritis in several joints.

On May 8th, 1916, the cataract was extracted by Dr. Geo. W. Swift, Dr. MacWhinnie assisting. Combined extraction right lens, no accident. On the second day afterwards she developed a rapid heart which soon improved under digitalin treatment.

May 15th she was allowed to return home. Eye still red, some cortical substance left. Anterior chamber deep, coloboma correct.

June 2nd, vision with +10.00 \subset +3.00 c. ax. 15° = 4/10, clear vitreous and cornea, no spots. August 1st, slight capsular opacity needled. Dec. 5th, 1916, vision 5/10, with +10.00 sph.

July 30th, 1917, eye became painful one week ago and now can hardly see, tho better than last week. Feels no irritation in the eye. She has a low grade uveitis with contracted pupil. The coloboma is hard to make out. A plastic exudate has drawn the pupil upwards.

March, 1919, very small pupil. Sees to get about only with difficulty. X-ray of teeth shows pyorrhea alveolaris and several apical abscesses. These teeth

were extracted and appropriate treatment given to her pyorrhea.

May 16th. Eye white, comfortable, sight improving, health much better. When the uveitis has subsided it is hoped an iridectomy will improve her vision.

Diagnosis: Endogenous uveitis from focal infection. Case reported to show association of a focal infection with plastic uveitis showing immediate improvement on removal of the focal infection. I see no need to call this a case of sympathetic ophthalmia. Only a histologic examination of the eye could say whether or not nodular choroiditis with epithelioid and giant cells was present. "Plastic uveitis is no part of the sympathetic process per se. (Fuchs.)

Presence of giant cells and epithelioid lymphocytes in characteristic arrangement and distribution may be found in sympathetic ophthalmia at a certain stage, but undoubtedly cases of the disease occur in which these cannot be found. (Parsons.)

A case, in which the classic diagnostic points were all present, except the *histologic* findings, recovered following the discovery and removal of a focal infection after failure to cure by removal of the exciting eye. If it be objected that this case was cured by removal of the exciting eye and that iridocyclitis later was an entirely new affection, I answer, "How then is one to know save by post-mortem histologic examination of the sympathizing eye whether one is dealing with sympathetic ophthalmia at all?"

The discovery and removal of a focal infection and the cure of an endogenous iridocyclitis thereby is so common an event that we must admit focal infection to be a possible etiologic factor of the highest importance. Wibaut's production of a characteristically grouped infiltrate of epithelioid and giant cells, by anaphylactic means, appears to the writer to solve the problem of the exciting eye.

The problem of the sympathizing eye is not far from solved when we grant the possibility of predilection. A split protein having predilection for uveal tissue, or a streptococcus having a predilection for uveal tissue can find its receptors, to use Ehrlich's term, nowhere else

but in the sympathizing eye. Parsons' remark that, "It should not excite surprise to find pyogenic germs in the eye" and that "We should not mistake the granules of mast cells for bacteria" gives indirect evidence that bacteria are frequently present in the uveal tract. (See Fuchs on this point.) If this is indeed true we have only to find similar bacteria in the eye, and a focal infection at the same time, to uncover a condition ripe for an anaphylactic inflammation of the second eye.

That a focal infection, of a streptococcus viridans for example, is often present as the exciting cause of an iridocyclitis I believe fully. It should excite no surprise if a patient having a focal infection of this germ, or any other, receive a trauma to an eye, or a perforating trauma, deliberate or accidental.

Sympathetic irritation can scarcely be held either to decrease the liability to iridocyclitis in the presence of a focal infection or to increase the defenses of the second eye.

The inference by many authors that because panophthalmitis or suppurative choroiditis does not supervene we should rule out the pyogenic bacteria, is an illogical inference. Likewise the statement that because a long incubation period exists we must infer the action of a germ similar to the tubercle bacillus or spirochete, leaves the anaphylactic reaction altogether out of consideration.

All toxic protein products are not ptomaines. A comparatively innocuous protein may become toxic by a parenteral digestive splitting; as Vaughan has shown, and as Wibaut also has demonstrated by producing anaphylactic inflammation by horse serum.

The exciting eye in other words may itself assume the role of a focal infection and become in fact a focus of infection where the bacteria having predilection for uveal tissue are incubated. Moreover transmutation may occur there.

To my mind an endogenous septic endophthalmitis may occur in any eye at any time, trauma or no trauma, whenever there is present in the body a focus of infection from which toxins or bacteria can escape into the circulation. In a case of sympathetic oph-

themia it is not a question of removing the exciting eye only. We should remove not only one-half or three-fourths or seven-eighths of the poison or source of poisoning, but all of it. Having a case of uveitis we should search all the possible locations for focal infections and not be content with the removal of the focus which is located in the exciting eye.

CONCLUSIONS.

Sympathetic ophthalmia is an anaphylactic inflammation of the sympathizing eye.

Elschnig is right in so considering it, altho I cannot believe that such anaphylaxis is *always* caused by proteins originating in the digestive tract.

A focal infection caused by an invader similar to that implanted in the exciting eye furnishes the larger dosage required to determine anaphylaxis. (The sensitizing dose being always less than the determining dose.)

Besides the size of the dosage other factors enter into the process, such as predilection, virulence, and affinity of the bacteria.

In every endogenous uveitis the proteins of the septic emboli have already been subjected to, and perhaps modified by, the nonspecific defenses of the blood, as well as the specific defenses of the focal area, from which they may have escaped. This suggests a possible reason why the processes of local immunization are ordinarily operative, and that immunity not sensitization is the usual outcome in loco.

With the implantation, however, of bacteria from without which have not been so subjected or modified, having certain affinities, the establishment of a local defense creates predilection for this same tissue and the second eye is thus sensitized rather than immunized.

The focal infection now supplies the increased dosage required to bring about an anaphylactic reaction and after the time necessary to sensitize has elapsed the reaction occurs.

This hypothesis gives us a working guide as to what we may do for the patient, namely, give him the most minute search for focal infections.

VISUAL DEFECTS OF THE WEST POINT CADETS.

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This is a study based on statistics of the past six classes of the Military Academy, presented in tabular form.

The West Pointer is trained to be as nearly physically perfect as possible. He is carefully selected, physically, before he is admitted; and almost the only defect he is allowed to have on entrance is one of vision. The visual requirements are as follows:

For the Hyperopic: Vision must be 20/30 correctible to 20/20.

For the Myopic: Vision must be 20/40 correctible to 20/20.

For the Astigmatic: Vision must be 20/30 correctible to 20/20.

In all cases there must be no disease of the fundus.

This, from the start, means that more myopes are admitted than hyperopes

(statistics show six to one). Myopia develops or becomes known during the course of the cadet more often than hyperopia (curiously enough the statistics show 6 to 1 here also). Hence the refraction problem is one dealing with myopia almost entirely, and probably, for this reason, the graduation requirements are 20/100 in each eye correctible to 20/20.

As the classes have increased in number it is interesting to note that the percentage of defects in vision, both at admission 10% and graduation 20%, have remained practically fixed. This shows that about the same relative number develop trouble in the cadet corps as were admitted with it.

The cadets' work during the summer is outdoor work, requiring good distant vision for firing on the range; and on practice marches for reading signals and, with the field glass, to pick up silhouette and moving targets. Without good vision he misses seeing the "enemy" and is unable to direct the fire of his men, either as to direction or range. The man in the ranks needs vision enough to make out rough landmarks. He does not need to see the enemy, as his target is designated for him by his officer.

In winter the cadet must study long hours, often over fine work such as higher mathematics and mechanical drawing, which requires more accurate vision than reading only. He recites daily and his standing depends on daily averages, so he must work.

These long hours of work produce a spasm of the ciliary muscle which might be mistaken for a pure myopia. In the Spring the vision is often 20/70 or less and after the Summer's rest from near work the vision comes up to 20/30 or 20/40. These cases are so frequent that it is not rare to hear graduates of West Point talk about the "peculiar eye condition of the cadets at the Point." This condition is a permanent state of excessive tension of the ciliary muscle; and mainly affects myopic eyes, which, by it, are made to appear more myopic than they really are, and is distinct "from the continuous tension of the ciliary muscles in hypermetropes when overcoming their hypermetropia so as to see distinctly." (Fuchs p. 910.) We found no fundus lesions, no field changes and no tension changes in any of these cases, but all were in myopes, and in some there was an apparent decrease in the range of accommodation.

Owing to the need of each cadet being able to work each day, it is very hard for them to give up time to be refracted under atropin or to have atropin used as treatment. We adopted the plan of re-

fracting every man with a known defect during the summer, and should one develop trouble later we had saved him the loss of time due to a cycloplegic.

At each graduation time we found 20% of the class with visual defects. One-fourth of these read 20/70 in one eye and 20/100 in the other, and another fourth could not read that much. All these men were accepted into the army as officers, and about half of them started in the Academy with defects of vision which progressed each year. Our figures show that 50% of the men who were admitted with vision below normal had progressively lower vision at each examination.

When a man reported for examination for admission and we found a visual defect, we felt that his chance of the defect progressing were "fifty-fifty," and almost no chance at all for improvement. One out of every ten men will develop trouble before he graduates.

In 1917 we found that the system of lights was very poor. Most of the men sat in a glare so the wearing of eye shades was almost universal, and at the same time they were working in shadows. Each man sat at his table with a light behind him, so arranged that it shone into the eyes of his room-mate. We had a better system put in and were hoping to have less trouble, when the size of the cadet corps was increased so that often four men were put into a room intended for two. This made it impossible to tell how much the improper lights had to do with the development and the progress of visual defects.

Much of this condition could be eliminated by a strict adherence to the entrance requirements which we believe should be 20/20 in each eye. Certainly no case not meeting the requirements should be placed on probation, for there is very little chance for improvement taking place to meet later requirements.

Summary of Visual Defects in Classes (1916-1921) Table I

Class of	Total De- fects	% De- fects	Abnormal on admission								Normal on admission							
			No.	m	ma	cma	h	ha	cha	mx	No.	m	ma	cma	h	ha	cha	mx
Class of 1918: 142 men.....	27	19	13	7	2	3	0	1	0	0	14	2	1	6	0	4	0	1
Improved												2	0	0	0	0	0	0
Defect increased.....												0	0	0	0	2	0	1
No change.....												0	1	0	0	2	0	0
Class of 1919: 137 men.....	30	21.9	16	10	0	5	0	0	1	0	14	7	0	4	0	1	1	1
Improved				0	0	0	0	0	0	0		0	0	1	0	0	0	0
Defect increased.....				0	5	0	1	0	0	0		4	0	0	0	0	0	0
No change.....				0	5	0	4	0	0	1		3	0	3	0	1	1	1
Class of 1920: 237 men.....	34	14.3	18	13	1	0	0	1	3	0	16	6	1	7	1	0	1	0
Improved				1	0	0	0	0	1	0		0	0	1	0	0	0	0
Defect increased.....				9	0	0	0	0	0	0		4	1	4	0	0	0	0
No change.....				4	1	0	0	1	2	0		2	0	2	1	0	1	0
Class of 1921: 313 men.....	46	14.8	14	8	0	1	0	2	3	0	32	10	4	10	1	2	4	1
Improved				0	0	0	0	0	0	0		2	1	2	0	1	2	0
Defect increased.....				8	0	1	0	2	3	0		5	1	7	0	0	0	0
No change.....				0	0	0	0	0	0	0		3	2	1	1	1	2	0
Class of 1917: 2 years before graduation....	11		6	4	0	2	0	0	0	0	5	0	0	5	0	0	0	0
Class of 1916: 126 men, 1 year before graduation	18	15.9	10	8	0	2	0	0	0	0	8	2	0	6	0	0	0	0

	1918		1919		1920		1921	
	Below at grad.	Just passed	Below at grad.	Just passed	Below at grad.	Just passed	Below at grad.	Just passed
Entered below requirements.....	0	2	5	0	4	2	0	2
Entered with defect, but passed requirements..	1	2	1	2	1	2	0	7
Normal at admission.....	2	3	3	3	0	0	1	1
Totals	3	7	9	5	5	4	1	10
	10		14		9		11	

KEY TO TABLE I.

M—Myopia. Ma—Myopic Astigmatism. Cma—Compd. Myopic Astigmatism. H—Hyperopia. Ha—Hyperopic Astigmatism. Cha—Compd. Hyperopic Astigmatism. Mx—Mixed Astigmatism.

CYCLODIALYSIS.

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The history and method of performing this operation, the manner in which it proves effective, the class of cases to which it is suited and the results obtained by it, are here discussed with six abstracts of illustrative cases, and a bibliography. Read before the American Academy of Ophthalmology and Oto-Laryngology, October 18, 1919.

HISTORY. In 1905 at the Heidelberg Ophthalmological Congress, Heine¹ first described an operation which he had performed twenty-six times for the relief of increased intraocular tension. He termed the procedure "Cyclodialysis," a name which has remained. The technic was set forth in detail as were the cases upon which it was tried, followed by a discussion of the *modus operandi* resulting in a balance of intraocular tension. This latter point will be set forth at length in the subsequent pages. The operation found favor immediately in the Continental Clinics, where it was tried extensively on all forms of increased tension. But in this country only a few operators attempted the procedure.

TECHNIC. The following are the steps of the operation:—

a.) Usual aseptic precautions with instruments, conjunctival sac, etc.

b.) Curvilinear incision of the conjunctiva, 8 millimeters long and 8-10 millimeters above the limbus.

c.) Free undermining of the conjunctiva toward the limbus.

d.) Tangential incision thru the sclera, 6 millimeters long and 6-8 millimeters above the limbus.

e.) Introduction of the cyclodialysis spatula thru the incision, hugging the inner surface of the sclera, while a forcible rocking motion thrusts the tip of the spatula into the anterior chamber.

f.) Free sweeping motion of the spatula to the right and left, forcibly

separating the adherent ciliary body from the sclera and freeing the chamber angle. Withdrawal of the spatula.

g.) Closure of the conjunctival wound with one or two sutures.

But few of these steps need detailed discussion. The incision of the sclera is the most delicate phase of the entire operation. In his earlier publications, Heine¹ advocated the use of a short keratome for this incision, but a very round-bellied, extremely sharp scalpel has proven more successful. The complete incision should not be attempted at one stroke for fear of injuring the underlying ciliary body; a more rational technic is a series of short light strokes that eventually separate the scleral fibers without impinging upon the ciliary body. Considerable bleeding accompanies this step and occasionally it is necessary to interrupt proceedings to stop the hemorrhage from the small scleral vessels with tampons soaked in adrenalin.

The introduction of the spatula is the most difficult step in the entire operation. It is absolutely imperative to keep the rounded tip well elevated and pressed tightly against the inner surface of the sclera, while a forward rocking motion wedges it into the anterior chamber. This step is painful, despite a preliminary subconjunctival injection of cocain. Failure to adhere to this technic may lead to a perforation of the choroid or an injury to the ciliary body. Fridenberg² found that this constituted his greatest stumbling block in the operation. In case either of the above mishaps occur, partial withdrawal and adherence to the proper path will accomplish the desired result. That such an occurrence is not necessarily dangerous may be seen from the following case:—

In 1909, this patient was treated for many weeks with the usual miotics. He had a well advanced glaucoma simplex, with a deep cup, vision almost nil and tension that remained around 60 mm. of Hg. On November 30, 1909, a cyclodialysis was performed. At the first attempt the spatula entered behind the iris and a trace of vitreous appeared in the wound. There was no undue reaction to the operation and the tension remained subnormal for about three

months. It then rose to 47 mm. of Hg, but under miotics, quickly dropped to around 20 mm. of Hg, where it has remained to date. The tension of the eye has been taken every three or four months and it has never been found above 20 mm. of Hg.

Hemorrhage into the anterior chamber may or may not occur, depending upon whether a perforating scleral vessel has been injured or not.

As soon as the tip of the spatula appears in the anterior chamber, a lateral sweeping motion should be made, including at least one-third of the entire periphery and extending well back so as to free the chamber angle as well as separate the ciliary body from the sclera. Hemorrhage is bound to occur during this phase of the operation and it cannot be checked, but will cease of its own accord within a short time. If so desired, the anterior chamber may be emptied at this time, merely by depressing the entire spatula and allowing the bloody aqueous to flow out thru the scleral wound. But in case a retention of the anterior chamber seems advisable, as for example in a hemorrhagic glaucoma, the spatula should be pressed continuously against the sclera, thus keeping the path of exit closed. Upon withdrawal of the instrument, the path closes spontaneously.

The use of atropin following the operation depends upon the case. Should any indications of inflammation be present, a single drop may be advisable; but in the average case *where a cyclodialysis is indicated*, the use of atropin is superfluous. For a more detailed description of the operation, the reader is referred to Heine (1), (2), (3), Denman (4), and Meller (32.)

RATIONALE. The operation of cyclodialysis was conceived on a basis of Fuchs' work on the anterior choroid following cataract extraction. Heine believed that the operation would open a path of filtration from the anterior chamber into the suprachoroidal spaces, thus allowing of a slow absorption of the aqueous, (1), (2), (3), (5). But the fallacy of this theory was soon shown, partially by the experimental work on animals of Krauss (6), Judin (7) and (8) and Wichodzeff (9), and partially by

the study of operated eyes by Weekers (10), Heine (11), and Stock (12). Observations based upon animal experimentation alone are insufficient because of the different anatomic and pathologic conditions present, as was admirably shown by Wernicke (13). Pyle (22) considered that a cyclodialysis was effective because of a subsequent atrophy of the ciliary body, with accompanying decreased formation of aqueous. But today, the consensus of opinion is that the success of a cyclodialysis depends upon freeing the angle of the anterior chamber, opening the filtration spaces and allowing of a normal escape of the aqueous.

But in certain cases, probably of an inflammatory character, this mode of exit becomes closed, subsequent to the operation, and the cyclodialysis is termed a failure. In all likelihood, there exists an inflammatory formation of fibrin which clogs the filtration angle, and lodging there, becomes organized. But to determine a priori which cases will react in this manner is impossible. It is probable that the younger the individual is and the more inflammatory his reaction toward the known trauma of operation and the unknown etiologic factors of increased intraocular tension, the less will be the chance of a successful result of a cyclodialysis. The following case is illustrative of that point:—

In 1914, a young woman, aged 35, was refracted under homatropin and her right pupil remained dilated subsequently. When seen, three months later, her right pupil was 6 mm. wide and rigid. There was no excavation of the disc; the tension was 60 mm. of Hg.; the vision was 0.6. The usual miotic treatment was attempted for one month, but without success. A cyclodialysis was performed in April, 1914. One week later, the tension was 31 mm. of Hg. and it rose continuously for a month, when it registered 58 mm. of Hg. A corneoscleral trephining was then performed and the tension has remained normal ever since. The vision has remained at 0.6.

On the other hand, cyclodialysis has proven very successful following an iri-

dectomy that has failed to reduce intraocular tension permanently. Such cases have been reported by Knapp (14), Denman (4), and Heine (11). In fact, Knapp (14) considers that the failure of an iridectomy to maintain normal intraocular tension constitutes the main indication for cyclodialysis. In these cases, the effect is probably due to the opening of the chamber angle, which was closed by organized adherence of the root of the iris.

SELECTION OF CASES. Even more important than finished technic is the proper selection of cases upon which to perform the operation of cyclodialysis. Owing to the character of the operation and its *modus operandi*, *increased intraocular tension alone is not an indication for cyclodialysis*. This was not known during the first few years of the operation and many of the unfavorable results were due to injudicious selection. Witness, for example, the case reports of Stock (12), Elschnig (15), Boldt (16), Krauss (6), Judin (7), Meissner and Sattler (18), Waldstein (19), Morax and Fourriere (20), Knapp (14), and Heine (11).

In one of his later papers, Heine (23) laid down absolute indications and contraindications for the use of cyclodialysis in terms that cannot be improved upon: "*The more acute the glaucoma the more urgent the indications for immediate operation, the better will be the results of iridectomy; the more chronic the glaucoma and the less urgent the indications for immediate operation, the more favorable will be the results of a cyclodialysis.*" Compare this with the indications pointed out by various other authors:

Knapp (14) considers cyclodialysis to be indicated in cases of advanced chronic glaucoma where an iridectomy has failed to reduce the tension. Stock (12) prefers to do a cyclodialysis in cases of chronic inflammatory glaucoma and glaucoma simplex, where from the character of the case, an operation is to be feared and he considers the operation merely as a preliminary to a subsequent iridectomy.

Elschnig (15) advises that in glaucoma simplex and in fresh inflammatory glaucoma, a cyclodialysis be tried

and if not successful, be followed by other operation; in all other types, it is the operation of choice. Zentmayer (24) recommends cyclodialysis in the operative treatment of absolute glaucoma.

Gradle (25) advocates a cyclodialysis in cases of glaucoma simplex on the basis that if successful, a maximum of good has been done with a minimum of harm; but if unsuccessful, there has been no bar introduced to the resort to further operation of greater severity. Posey (26) prefers a cyclodialysis if there is any evidence of hemorrhagic tendency, or if the visual field is reduced greatly.

Practically all operators have found cyclodialysis highly successful in non-inflammatory absolute glaucoma. This has been particularly emphasized by Meller (17) and Zentmayer (24). The following is a typical case of this character:

An aged negro was seen with an absolute bilateral glaucoma. One eye was painful with tension of 75 mm. of Hg. A cyclodialysis was performed upon this eye and the tension promptly sank to normal where it remained for the seven months he was kept under observation.

Summed up briefly, the indications for cyclodialysis may be stated as follows:

1. Glaucoma simplex that has failed to respond to continued miotic treatment and in which there is but little evidence of an inflammatory reaction.

2. Borderline cases of chronic inflammatory glaucoma where an iridectomy is to be feared or where the visual field is greatly reduced.

3. Acute inflammatory glaucoma with a hemorrhagic tendency.

4. Noninflammatory absolute glaucoma.

5. Any case of glaucoma simplex in which a more severe operation is feared and which can be watched carefully for a long period of time.

6. Any eye with increased tension upon which an unsuccessful iridectomy has been performed.

The contraindications are less specific:

1. Acute inflammatory glaucoma.

2. Chronic inflammatory glaucoma of the exudative type.

3. Glaucoma simplex in a young individual which resists miotic treatment.

4. Buphthalmus.

RESULTS. Judging from the earlier reports, the results of cyclodialysis were not particularly favorable from the standpoint of immediate or permanent reduction of intraocular tension. Thus Stock (12) reported five cases with three failures; Weekers (10) recorded five successive failures. Krauss (6) condemned the operation on the basis of two unsuccessful cases, as did Judin (7). Morax and Fourriere (20) had poor results with one case and abandoned the method. An analysis of these cases will, however, explain the unfavorable figures, because in nearly every case, the operation was not based upon the proper indications or else was attempted as a stop-gap when repeated iridectomies had failed. This was clearly shown by Pyle (27).

A careful selection of cases in the hands of competent operators led to more successful results. Wernicke (13) found that among sixty-one cases observed for a period of two years, 57% were permanently improved and that in the cases where one eye was iridectomized and its fellow subjected to a cyclodialysis, the results were about equal. Ohm (28) was particularly successful in the two cases upon which he tried the operation. A drop of tension to normal with a marked improvement in central vision and visual fields was reported by Zentmayer (29) in three out of the four cases thus operated upon. Brown (30) had one case completely relieved by cyclodialysis. Three cases with results that were permanent during the period of observation were recorded by Denman (4). Elschnig (15) performed cyclodialysis one hundred and nine times on eighty-five eyes with permanent results in fifty-four of the eighty-five. Thirty-seven cases were operated upon by Boldt (16) and in thirty-one of them there was an improvement which proved permanent in twenty-five. Small (31) added one case to the number of good results reported. Meissner

and Sattler (18) made a careful study of fifty-four operations of cyclodialysis and reported 28% good results; as a good result they termed a case where the tension remained normal for six months or more and where the central vision remained equal or improved. One hundred and seventy-six cases were reported from the Elschinig Clinic by Waldstein (19) with approximately the same results as in the earlier Elschinig report. In his last paper, Heine (11) analyzed ninety operations upon seventy-nine eyes; in seven, there was no result; in twenty-three, there was a temporary result necessitating further operative interferences; in thirty-four, the result was good, but the period of observation was too short to call the result permanent; in twenty-six, the result was good for more than nine months. Meller (17) obtained permanent results in 40% of the cases, temporary relief in 30%, and no result in 30%.

From these figures, it can be seen that experienced operators who have tried the operation over a larger series of cases, have had fairly uniform results. The figures given by Meller (17) are somewhat lower than the average obtained by an analysis of the cases reported in detail. Thus sixteen operators presented three hundred and seventy-one cases with two hundred and eleven good results (57%), fifty-four temporary results (14.5%), and one hundred and six failures (28.5%). Absolute reliance cannot be placed upon these figures because some of the cases were not observed a sufficiently long time to insure their proper placing. This would tend to reduce the percentage of good results and increase the percentage of temporary results.

The operation cannot be properly adjudged by the results of any one operator, nor any series of operators unless certain set rules are observed; there must be a proper selection of cases; and the cases must be watched and studied for from six months to two years after operation. The proper selection of cases has been discussed, but the proper tabulation of results is equally important and the tabulation

must be based upon the behavior of the central vision, the visual fields, and the intraocular tension.

After a successful cyclodialysis, an improvement in central vision is not to be expected because, in a case suitable for this operation, the impaired vision is due to pressure death of nerve fibres, and retinal elements, rather than to the active manifestations of pressure. Consequently, relief of increased intraocular tension can have no influence upon the degenerated nerve elements. If the operation is a success, the vision should show no further decrease, provided nutritional disturbances of the lens have not made their appearance. But if beginning opacity of the lens is present, it is not unusual for the opacity to proceed until it becomes complete.

A 67 year old man appeared with a glaucoma simplex of one year's duration. The vision was reduced to fingers at 2 meters, owing to lenticular opacities. The tension never was above 47 mm. of Hg. After miotic treatment for eleven months, a cyclodialysis was performed. The vision gradually decreased, altho the tension remained about normal. Fourteen months after the original operation, the tension rose to 40 mm. of Hg., but easily controlled by miotics. In view of the advancing opacity of the lens, an iridectomy was performed and through the resultant coloboma, it could be seen that the lens was completely opaque. The patient died of an intercurrent febrile complaint before the lens was extracted.

The behavior of the *visual fields* is influenced to a great extent by the same factors that control the central vision. The regular contraction of the field is due to the increased intraocular tension and its uniform pressure upon the periphery of the retina, whose fibres are subjected to increased pressure over a longer distance than are the fibres from the more central areas. This is shown by the fact that the visual field is contracted before an enlargement of the blind spot occurs. The irregular indentations in the visual field are due to the increased pressure upon the nerve fibres as they pass

over the edge of the cupped optic disc, pressure, as it were, upon a knife edge. If the increased pressure has existed a sufficient length of time to cause a death of these nerve elements, a successful cyclodialysis will not increase the size or regularity of the visual fields; on the contrary, there will be a slight decrease owing to the advancing atrophy which cannot be stopped merely by a resumption of normal intraocular pressure. On the other hand, if the increased pressure is of recent origin, a successful operation will restore the visual fields to approximately their normal condition, because in the early stages, the contractions are merely due to a pressure blocking (which would eventually lead to atrophy). Completed abolition of the central field, such as occasionally occurs after iridectomy, has never been reported as a sequel to cyclodialysis.

The intraocular tension is, after all, the most reliable index as to the success of an operation. It is undoubtedly true that the tension as recorded by any of the existent clinical tonometers is not the actual intraocular tension as measured by the proper manometer. But the difference between the tonometric tension and the manometric tension, for any one eye, is constant, and therefore the clinical tonometer is accurate in that it gives a comparative measure of the intraocular tension of an eye from one period to another. (Parenthetically speaking, with this thought in mind, it is to be regretted that a recently devised tonometer is provided with a scale that does not agree with those already established in clinical use, any more than it agrees with the absolute manometric tension.) Consequently, the measurement of intraocular tension for a period before and after operation furnishes a definite guide as to the behavior of the eye and the success or failure of the operation. After a successful cyclodialysis, the tension may drop immediately to subnormal, especially if the anterior chamber has been emptied during the course of the operation and may remain so for several months.

In 1907, a 36 year old woman was found to have a tension in the left eye that was questionably plus 1, but distinct-

ly more than in the right. The disc was excavated with a sharp nasal border and slope on the temporal side. The vision was 20/70 and could not be improved. Under eserine, the tension did not change.

Three years later, she instilled a drop of atropin designed for her daughter. When seen three weeks later, there was a total cupping of the disc, the tension was 60 mm. of Hg. and the vision was 40/100. Efforts were made for three months to control the disease with miotics and subconjunctival injections of sodium citrat, but without avail.

A cyclodialysis was finally performed, following which the tension sank to 11 mm. of Hg., where it remained for about three months. It gradually rose to 20 mm. of Hg., where it remained for the fourteen months longer that she was under observation.

On the other hand, in an equally successful operation, the tension may remain high for from three to seven days and finally become subnormal for a short period, after which it gradually climbs to normal. Cases that behave in this manner are particularly apt to be successful. Meller (17).

Frequently a cyclodialysis will be successful in maintaining normal tension for several months or even years, but eventually there will be a gradual increase in tension that threatens the life of the eye. Such cases are particularly apt to yield to a second or even a third operation and remain normal ever after.

In November, 1909, a 42 year old man came with a glaucoma simplex in the left eye. The disc was incompletely cupped, the vision was 40/70, correctable to 40/50 and the tension was plus one. Treatment with miotics was pursued for nearly three months, but the tension remained around 37 mm. of Hg. In January, 1910, a cyclodialysis was performed. The tension remained normal until the end of March, and then rose to 34 mm. of Hg., from which height it could not be reduced. In May, 1910, a second cyclodialysis was performed and the tension again sank to normal and remained there until July, 1912. Then it rose to 37 mm. of Hg. and again could not be controlled. In September, 1912, a third cyclodialysis

was performed. Following this the tension sank to normal and has remained there to date, being measured every four months. In July, 1919, the tension was 22 mm. of Hg. and the corrected vision was 0.9.

But in the cases where the intraocular tension falls to normal or subnormal immediately subsequent to a cyclodialysis, and then becomes pathologically high within a week to a month, there is no objection in repeating the operation, for a second or a third cyclodialysis will be no more successful than the first, and another type of operation must be resorted to.

One final word regarding the prognostic value of intraocular tension, both before and after operation. P. Knapp (33) showed that the tension of the normal eye is reduced on an average of 8.91 mm. of Hg. by three minutes of deep massage, altho this reduction is temporary and disappears within about twenty minutes. This procedure is of inestimable value in glaucoma, for it permits of a knowledge of the condition of the drainage of the aqueous. A failure to reduce intraocular tension by two or

three minutes massage by more than 4 mm. of Hg. is indicative of blocked outlets and must be taken into consideration in forming the prognosis.

CONCLUSIONS: 1. Cyclodialysis is an operation that decreases increased intraocular tension, by freeing the angle of the anterior chamber of adhesions.

2. The particular indications for the use of cyclodialysis lie in the essential chronicity and freedom from inflammatory reaction of the disease.

3. Cyclodialysis is distinctly contraindicated in acute glaucoma, in glaucoma of an exudative or inflammatory type, and in cases where immediate operation is desirable.

4. The effects of a cyclodialysis must be judged by the behavior of the central vision, the visual fields, and the intraocular tension.

5. In about 50 per cent of the cases with proper indications, cyclodialysis is successful; in about 20 per cent of such cases, it produces temporary results that usually become permanent by a second or even a third operation; in about 30 per cent it is a failure.

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NOTES, CASES AND INSTRUMENTS

OCCCLUSION OF CENTRAL ARTERY OF RETINA, RELIEVED BY PARACENTESIS OF CORNEA.

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A patient consulted me in June, 1919, complaining of sudden loss of vision in one eye. He awoke about 6.30 a.m., and was quite certain his vision was good in both eyes. In a half hour he became very much alarmed by the discovery of complete blindness in the right eye.

I examined the patient at my office about three hours after the onset of blindness and found the eye blind, due to occlusion of the central artery of the retina. The pupil reacted very sluggishly to light, and was larger than the other pupil. The margin of the disc was hazy, and the arteries reduced in size. There was a general edema of the macular region with the cherry red spot at the fovea.

A paracentesis of the cornea was immediately performed, and a dressing applied to the eye. The following day the vision was 6/5 with correction, and the fundus and the field of vision were normal.

This patient had been examined by me for glasses on three previous occasions, during the past ten years. He never had any attacks of loss of vision previous to this one, which would suggest an embolus rather than spasm.

TONOMETERS, PRESENTATION OF A NEW ONE SIMPLE AND PRACTICAL.

EDWARD J. BROWN, M.D.
MINNEAPOLIS.

Four years ago, having lost the conceit that my fingers were trustworthy in determining intraocular tension, I became interested in tonometers. Having some good friends and neighbors who had tonometers, which they seldom used, I was able to borrow the standard instruments, Schiötz, Gradle and McLean.

I also ordered a Souter, subject to approval. With the latter I was unable to observe the denting of the cornea and read the scale at the same time, or to lock the instrument without so much displacement of the indicator as to make the observation worthless.

The size of the foot-plate of the Schiötz and McLean instruments (10 mm.) made them difficult to apply to the

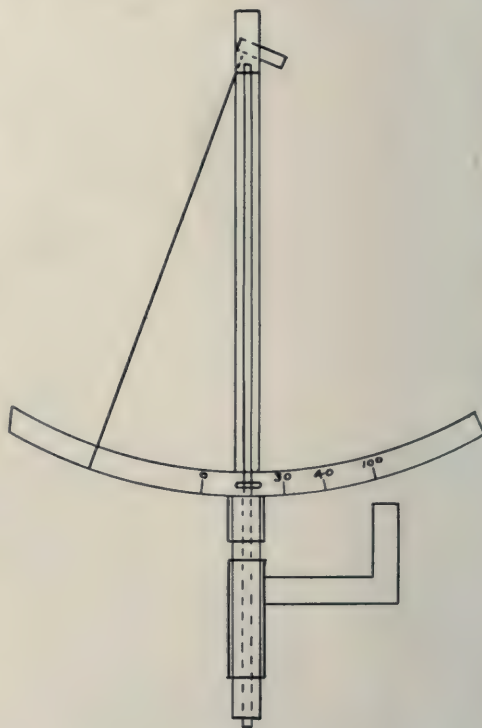


Fig. 1. A New Tonometer (Brown).

cornea in a large number of cases; and the differences of corneal curvature, as well as the personal equation of surgeon and patient, introduced elements which made the results too often contradictory and unreliable. The Gradle had a smaller foot-plate (8 mm.), but like the Schiötz had a scale too distant from the foot-plate, and like the latter required weights and the use of a table for determining the tension in terms of mercurial pressure.

I ventured to make the suggestion to Mr. Meyrowitz, the maker of the Mc-

Lean, that he make a 6 mm. slightly convex foot-plate for the instrument of which I had the use. He courteously replied that he had sent my letter to the author of the instrument, who would write me. No other reply coming, I concluded to do some work of my own. I later learned by experiment that the suggestion of a convex foot-plate was not a good one for the reason that the contact of the plate with the cornea could be more readily noted by the slight reflex at the outer border.

At very small expense, but with a good deal of time and effort I constructed an instrument on the principle of measuring and determining in terms of mercurial pressure, the dent in the cornea made by a comparatively light plunger, while the 6 mm. slightly concave foot-plate descends to a contact with the cornea a distance of 2 mm. After using the instrument on a considerable number of patients and in comparison with the standard tonometers, I asked a skilled mechanic to make an instrument on the same lines, which is shown in the accompanying cut.

The scale was determined as follows: In one side of a large and substantial medicine dropper bulb a hole 10 mm. in diameter was cut and this was covered with two thicknesses of dental dam. The bulb was then slipped over the short end of a piece of heavy glass tubing bent at a right angle. The manometer was completed by adjusting a millimeter scale. Mercury being used at the different levels, 10, 20, 30, etc., up to 100 millimeters the instrument was easily tested and the scale determined. The instrument described seems to me more practical and more reliable than the other instruments in use, combining their good, without any of their bad qualities.

A SUGGESTION FOR A NEW PERIMETRIC CHART.

ALFRED COWAN, M. D.

PHILADELPHIA, PA.

All perimetric and campimetric charts give readings in degrees, which show the extent of the field of indirect vision along the direction of different meridi-

ans. This is very well for the field of vision, and might be considered all that is necessary. But it may also be interesting to know, for clinical purposes, at once and without the necessity of mathematical computation, the actual size of the blind spot itself; just how much of the retina is healthy; or the size of the lesion or lesions in pathologic conditions causing loss of vision in a circumscribed area. With the thought that this can be actually determined in a practical way, the following suggestion for a new perimetric chart is made.

The irregular outline of the normal field of indirect vision is due to the obstruction caused by the brow, nose and cheek, its greatest extent being over ninety degrees below and to the outer side where there is not this interference. Knowing this to be so, we may suppose that were it not for this obstruction, the normal field of peripheral vision would be exactly circular in outline and extend about ninety degrees in all directions.

Taking twenty-two millimeters as the approximate diameter of the interior of the globe and presupposing that the entire surface of the retina is sensitive to form, we would have, if it could be spread out, a flat circular area, the diameter of which would correspond or be equal to its previous circumference, which is 46.0768 millimeters. This result is obtained after allowing the anterior segment, back to and including the ora serrata, to be equal to one-third of the circumference of the eye and deducting the same.

The retina is now in the form of a flattened circular disc with a diameter of 46.0768 millimeters, receiving form impressions from a field of ninety degrees from its center outward in all directions, or one hundred and eighty degrees across the whole diameter. By this theory each degree in the field covers $1/180$ of 46.0768 or about .25598 millimeters, approximately one-fourth of a millimeter.

To apply this for practical purposes and for convenience of reading, a perimetric chart is ruled with straight lines running both horizontally and vertically, spaced four degrees apart. These lines form squares over the entire field, each

side being four degrees in the field, which would be equal to four times .25598 or 1.02392 millimeters on the retina. The old lines being allowed to remain, we now have two distinct systems:

1. Circular and radiating.
2. Vertical and horizontal.

The chart as now modified, shows not only the visual field as before, (circular and radiating system), but also represents a plan of the retina itself, divided into spaces, each being equal to an area

for practical purposes. The final result varies very slightly when the diameter of the globe is one millimeter more or less, or the plane in which the ora serrata lies is pushed forward or backward slightly.

It appears that a chart of this kind would be quite an improvement over the old. With its aid, we would be enabled to say at a glance and with a fair degree of accuracy, that the field is contracted so that only a certain portion extending over so and so many mil-

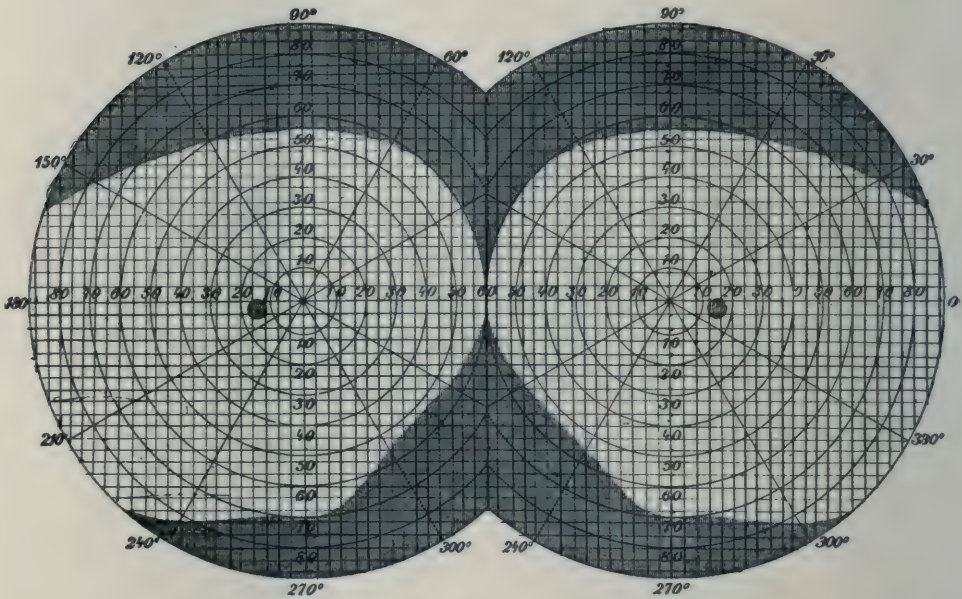


Fig. 1. Modified chart for recording fields. The series of vertical and horizontal straight lines are placed at a distance equivalent to one millimeter on the retina.

on it of close to 1.026256 millimeters square.

Thus the fields are taken as before and the chart marked in the usual way, the difference being in the reading after completion, which indicates millimeters on the retina as well as degrees in the field.

Of course, all these figures are in round numbers and the scale is certainly not mathematically correct, being based on anatomic rather than on optical principles. It is nearly enough accurate

limeters of the retina is functioning; or that the lesion causing a scotoma is such and such size. In presenting papers describing these conditions, it will not be necessary in many cases to accompany them with charts as heretofore, but the size and location on the retina may be given, making a better picture on the mind's eye than is possible by the old method.

It is obvious that the above scheme may be applied to the charts of any instrument for taking fields.

VISUAL DISTURBANCES FROM DAMAGE TO THE CENTERS.

CLARENCE A. VEASEY, M.D., F.A.C.S.,

SPOKANE, WASHINGTON.

Case 1. *Paralysis of accommodation from a blow on the occipital region.* D. W. D., a physician, aged forty-two, was first examined on January 30th, 1908. He stated that two days before he had a fall on the ice, striking the back of his head on the occipital region. He was dazed, but not unconscious. He thought also that there was a light blow on the forehead, but he was positive that he did not hit his nose, altho he bled slightly from the right naris. Eighteen hours after the fall he first noticed that his vision for reading with the right eye was greatly blurred, and it was for this reason that he presented himself for examination.

The vision of the right eye equaled 6/12+. The pupil was widely dilated and immobile, and there was complete paralysis of accommodation. The vision of the left eye equaled 6/5.

The patient was referred to Dr. F. X. Dercum of Philadelphia for a neurologic examination, but nothing abnormal was found other than the ocular condition referred to above. A skiagraph of the head was negative.

He was given iodid of sodium and subsequently strychnia, and on April 27th, 1908, nearly three months from the time of the accident and the appearance of the paralysis of accommodation, the latter had entirely returned.

The patient stated that he had not noticed that the accommodation had commenced to return until three weeks prior to its entire restoration.

Whether this patient had some disturbance in the center for accommodation or whether there was some peripheral disturbance in the nerve, it is impossible to say, altho from the nature of the blow and the subsequent behavior of the case the paralysis was probably due to a central lesion.

Case II. *Physic. blindness with right lateral hemianopsia.* Complete recov-

ery. D. C., female, aged sixty-one years, an unmarried school superintendent, was first examined March 16th, 1906, in consultation with Dr. Charles W. Burr, Philadelphia. The patient had had rheumatoid arthritis and valvular heart disease for a long time. Twenty-four hours before her eye examination was made the patient stated that she suddenly became blind in both eyes. According to the hospital interne who made the early tests, she was unable either to detect or to name light perception. When examined by me on the day following the appearance of the so-called blindness, both pupils were found to be $3\frac{1}{2}$ mm. in size, facing a moderate light, but neither reacted to light, and both reacted in accommodation and convergence. The movements of the eyeballs were normal in all directions, and the ophthalmoscope showed no fundus changes. There was present right homonymous hemianopsia, the line between the blind and the preserved field passing down the median line, the fixation point remaining in the preserved half. The patient could distinctly see all objects in the preserved visual fields, as was shown by various tests, but was unable to name any object from vision alone, but could do so just as soon as the object was touched.

Twenty-four hours later the visual sense was found to be returning, as the patient could recognize many objects from sight as well as from touch, but the pupillary reaction to light was still absent. Three days later the visual acuity and the visual fields were entirely restored; the pupils reacted somewhat sluggishly to candle light and rapidly to daylight.

This case is reported as simply showing the curious effect of physic blindness in which objects are seen but not recognized until touched, and in which recovery may or may not be complete. In all probability, the condition was due to some disturbance in the occipital lobe which cleared up rapidly.

STANDARDIZATION OF OPHTHALMOLOGY AND THE ETHICAL ATTITUDE OF ITS MEMBERS.

JOHN H. BURLERSON, M. D.

SAN ANTONIO, TEXAS.

During the last session of the Texas Legislature I was called to Austin to assist our Legislative Committee in defending our Medical Practice Act. The optometrists had introduced a bill which would in effect have emasculated one of the best practice acts on the statutes of any state.

The Attorney General of Texas, B. F. Looney, in an opinion given Feb. 21, 1913, said "it is our opinion that if the optometrists propose to treat defective or diseased eyes by the fitting of glasses, it would be practising medicine within the meaning of the Medical Practice Act of Texas."

I found on reaching Austin a committee of busy representative doctors, from all parts of the state, fighting to save our law and, to my great surprise, not an oculist among them.

From expressions heard in committee with these gentlemen and disgraceful charges made by opticians, before the legislative committee, which were apparently backed up by checks, and statements showing a part of the medical profession engaged in the work of ophthalmology to have relations and connections with opticians not in accordance with the principles of medical ethics, I have been prompted to present this subject for the consideration of our section.

Doubtless there are details of business management between the oculist and optician which must necessarily be adjusted but this section should come to a very clear understanding regarding their relations from a financial standpoint and the ethical attitude to be assumed by its members, otherwise county societies are likely to prefer charges and a very unfortunate situation arise.

The fight in the legislature with the optometrists has developed this fact:—It is charged by them that many specialists thruout the country are incompetent. The charge is apparently substantiated by numerous letters from

ophthalmologists who say they have no incentive in fighting optometrists when the eye, nose, and throat specialty is so full of men absolutely incompetent for their work.

The National Association has already made a start toward definite standardization of our specialty, and basing the opinion on remarks heard during the legislative session, our State Association will have the matter up for solution unless we solve it ourselves.

The position taken by some of the better prepared men of this section, that they do not care to enter this fight on account of incompetency of some of our members is a reflection on organized medicine, and most certainly a reflection on ophthalmology. It is our fight! If we don't make it no one else will.

That the eye, ear, nose, and throat men of the country must establish a standard or suffer the consequences, there can be no doubt. What this standard shall be is for us to determine.

My personal opinion is that a standard should be based upon attainment and not on length of study. I have met men who boasted an internship in an eye hospital who were good neither as diagnosticians nor operators. While on the other hand I have known men who had less preparation, who were up to the mark in every respect and making good.

It seems to me the most vital point for us to decide now is not to try to correct abuses of the past but to prevent those of the future. I have no criticism of any man for the way he conducts his practice, but I do maintain that we as a profession have a right to adopt both a standard of ethics and proficiency to entitle a man to membership among us. This is necessary if we are to maintain our standing in organized medicine.

Some years ago, when I was chairman of this section of the State Medical Association I advocated, in my address, the formation of an ophthalmologic society and the establishment of a standard. In those good old days many men of our section would have their names on the program of other sections, write papers, and discuss subjects of particular interest to the general practitioner, and in-

cidently boost themselves along in a quiet way to the neglect and detriment of their own section. It was only after the general body discouraged the practice that it was stopped. I am not reflecting on the men who did this, as it was a common practice.

Our section is getting stronger and more scientific all the time. Most of our younger men are starting with more preparation and the general outlook is better; but it seems to me the time has come when there should be no place for

the man who removes tonsils by the non-cutting method and straightens cross eyes without the knife, and who stoops to all the tricks of the trade to build practice. Such men are no better than the charlatan who puts his picture in the paper.

The time is opportune for this section to take action, appoint a committee to recommend a course to be pursued, both as to qualifications and conduct of these border line boys, be they large or small.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

ROYAL SOCIETY OF MEDICINE.

Section of Ophthalmology.

November 5th, 1919.

President, Mr. W. T. HOLMES-SPICER.

Disseminated Choroido-Retinitis.

DR. RAYNER D. BATTEN showed a case of acute disseminated choroido-retinitis, of doubtful origin. The changes all took place practically while the patient was under observation. He was first seen by the exhibitor at the end of March last. Three weeks previous to returning home demobilised, he had lost central vision in the right eye. A nearly flat subretinal patch was found to the temporal side of the optic disc, below the superior branch of the retinal vessel. It was about one-third the size of the disc, and was triangular in shape. A small retinal vessel passed over it, and it was surrounded by an area of edema. The remainder of the right fundus and the whole of the left fundus were normal.

The eye was examined about once a week. Towards the end of May, the whole of the right fundus was thickly strewn with patches of choroiditis, and these could still be seen in much the same condition. The central patch had now subsided, and the vision had improved. As the appearance was strongly suggestive of syphilitic choroiditis,

a Wassermann test was twice made, but was negative. There was no evidence of luetic disease about the man, and he strongly denied the possibility of such infection.

In December, 1916, when on military service, he had a wound on the foot, that was very tardy in healing. The area of the wound was still tender to pressure. A surgeon had declined to open up the foot again, on account of the stubborn healing on the former occasion. In August last the vision was: right 6/18, left 6/6.

When seen on October 2nd there was a history of sudden failure of vision in the left eye three weeks previously, with a central black spot. Later, a similar condition was found in the right eye, the vision in that eye being 6/9, the vision in the left having been reduced to 6/36. He asked opinions as to the likelihood of further attacks, and as to the probable causal agent.

DISCUSSION. The President thought the involved area was raised above the general level of the fundus, and his view was that the cause was sepsis, from the original focus in the foot.

Optic Nerve Tumor or Injury.

MAJOR J. F. CARRUTHERS showed a patient, 21 years of age, who was not aware of anything wrong with his vision until he was 14. His attention

was drawn to his eye, however, by increasing dimness of sight. As his other eye was good, however, (vision = 6/6) he paid no attention to it. He later had dragging pain at the back of the eye, and last June he attended the Herbert Hospital for treatment. A consultation was held, and operative measures were discouraged.

The man returned to work, but came again in July, and then the eye was found to be quite blind, and the pupil did not react to either light or accommodation, only consensually with the other. The pain he, the speaker, did not attach much importance to, as it did not seem to deter from sleep or enjoyment. There had been no injection of the conjunctiva, and the media were clear. In July there was a pearly-white organised mass covering the whole anterior surface of the optic nerve: no hemorrhages nor even vessels were apparent in or on it. There appeared to be a retino-choroidal rupture, and the structures inside a pigmented ring were evidently being drawn towards the under surface of the tumor. There was very little sign of progress since July.

DISCUSSION: Mr. Hugh Thompson, who saw the case in June, thought it was probably a birth injury to the nerve, a view in which several colleagues agreed. With the exception of a little more pigmentary disturbance, he saw no evidence of advance.

Mr. M. S. Mayou suggested the possibility of the tumor being tubercular, and asked whether the man had been investigated from that point of view.

Mr. Leslie Paton referred to a similar case, tho of less degree, which he showed before the Ophthalmological Society ten years ago. In that case there was no sign of rupture of the choroid. The discussion on it showed that most members considered it a congenital malformation in the connective tissue of the disc. The question whether or not this growth was progressing was an important one in considering whether the eye should be removed.

Colonel Parsons said Mr. Paton's

case was one in which there was a little mass at the edge of the disc. There was no absolute proof that the lesion was a growth. The eye was excised. The section gave an appearance exactly similar to Coats' disease, exudative retinitis; it was in a very early stage. He thought it very likely that the present case was one of birth injury at the head of the nerve, with subsequent cicatrization.

Mr. Treacher Collins suggested that there had been some hemorrhage into the vitreous, and that the white mass in front of the disc was organised fibrous tissue.

Major Carruthers replied that no tubercular or other disease was found at the medical examination, and the urine was normal.

Avulsion of Optic Nerve.

Mr. H. R. Jeremy and Mr. McMullen showed cases of supposed avulsion of the optic nerve head. Mr. Malcolm Hepburn did not agree with the diagnosis. Mr. Simpson showed a case of probably a similar character.

Macular Changes.

COLONEL PARSONS exhibited a case showing bilateral changes in the macula. When the young man's mixed astigmatism was corrected, his vision was practically normal. He entered the Army unaware of any optical defect, and remained three years, until he was examined again before leaving for Egypt with a draft. Then Mr. Secker Walker, of Leeds, finding the macular changes, quite rightly secured his release. The changes were of long standing, and he thought it likely they were caused by colloid bodies in the choroid. These bodies were usually found in elderly people, but they were found in young subjects of retinitis pigmentosa.

DISCUSSION: Mr. Treacher Collins thought the condition was probably retinitis circinata, i. e., hemorrhages into the retina itself, organising into white masses. The white patches round the disc seemed to be too extensive for ordinary colloid degeneration.

The President took the same view of the case as that expressed by Colonel

Parsons. In retinitis circinata there was, he believed, always some loss of vision, and generally the macula was very grey in appearance, what had been well described as a "passover bread appearance"—white masses with black holes in them.

Restoration of Socket.

MR. R. R. CRUISE showed a patient six months after a plastic and grafting operation on a damaged socket for the purpose of wearing an artificial eye. It showed either that the conjunctiva had encroached at the expense of the skin, or the graft itself had been so altered by the constant orbital moisture as to approximate to conjunctiva. He reemphasized the points he made when showing the case before the Ophthalmological Society six months ago.

The President expressed the congratulations of the Section to Mr. Cruise for his skill.

The Need of Ophthalmic Physicians.

DR. RAUNER D. BATTEN said the question discussed in his paper arose when a vacancy occurred on the staff of the hospital to which he is attached, and he urged that an ophthalmic physician rather than a surgeon was required. His arguments in favour of such an appointment were met by the reply that it was "not done" at other hospitals; and that, moreover, no men were available who had been educated for such a post. He was invited to bring forward the matter at the Royal Society of Medicine, and he now asked for an expression of opinion from members of the Section, not only as to the appointment of ophthalmic physicians for ophthalmic hospitals, but on the whole question of the education of ophthalmic men.

Cases requiring direct surgical treatment formed such a small part of the ophthalmologist's work, that he had to be responsible for a far larger clinic than he could personally attend to, if it was to yield sufficient operative material for the study and advance of the specialty. Hence large numbers of men were educated and given posts as clinical assistants, and given much re-

sponsibility; they became able ophthalmic observers, but were given no training in ophthalmic surgery, while their knowledge of medicine was insufficient to make them ophthalmic physicians.

The further advances in ophthalmology promised to be mainly on medical lines, therefore men with a physician's training and experience would be needed. New operations might continue to be evolved for glaucoma, the best form of cataract extraction could still be discussed; and some day there might be a successful operation for detachment of the retina or for conical cornea, tho he doubted whether success in these conditions was likely to come from the surgical side. On the medical side, however, there were endless possibilities, which the ophthalmologist tried to tackle with his detached scraps of medical knowledge.

The position of physicians attached to ophthalmic hospitals was that of consulting referees. They did not have patients of their own, for which they were answerable. Even in well-marked medical cases, the responsibility rested with the surgeon. In private practice, the responsibility was, more often, shared; and here, even if a case was referred to a physician, he was seldom in a position to study it from the ophthalmic point of view. At present the consulting physicians were not appointed for their knowledge of ophthalmology, but for their acquaintance with some branch of medicine, often the neurologic. The need was for ophthalmic physicians who would do their own work, who would have to live, so to speak, with their ophthalmic failures.

Among the instances in which the medical study would be valuable that he gave were:

1. Various vascular conditions associated with changing blood pressure, arteriosclerosis, vascular degeneration, thrombosis, and conditions associated with renal, hepatic and cardiac diseases.

2. Diseases of the central nervous system, not only the gross and obvious ones, but such obscure ones as unexplained optic atrophies, headaches, of

apparently visual origin, but without ocular defects.

3. The toxic and septic conditions causing ocular disease, such as iridocyclitis, concerning which knowledge was in an unsatisfactory state. Such cases were at present referred to the consulting physician, dentist, pathologist, etc., and after a negative report had been received from them all, the case returned for empirical treatment; whereas it ought to come back to the physician, who should "live with" it until he had found a cause. There was great need for improved training in research from the medical side.

Lastly, he mentioned various nutritional diseases, giving rise to corneal ulcers. Education as surgeons seemed to dull keenness and the power of investigating primary causes of certain ophthalmic problems. There was a hesitancy to stray beyond the orbit. In the case of cataract, in the ultimate issue, operation could be done to relieve the worst of the symptoms. Most of the systems of treatment depended on some local application to the eye, and were not based on investigation as to the cause. The fact that some cataracts would start rapidly and, after reaching a certain stage, become quiescent, pointed to some constitutional cause, one beyond the present power of recognition by surgeons.

He did not see how any thoughtful man could be satisfied with either the surgical diagnosis or treatment of many cases of glaucoma. There were a number which defied surgical treatment, and did not exhibit any of the anatomic causes, yet they progressed. Moreover some of the acute cases showed a virulence for which no anatomic explanation sufficed. He did not consider it was creditable to the ophthalmologist that, glaucoma having occurred in one eye, he was unable to prevent its onset in the other, except by operation. The attitude of the specialty towards detachment of the retina was even more hopeless.

The prime fault in this matter lay in the present system of educating the ophthalmologist, who was required to

pass the highest examination in general surgery, a large part of which had no bearing on eyes. His time would be better spent in acquiring some knowledge of medicine and of his own specialty. At present, a man might work ten or fifteen years at a leading ophthalmic hospital without doing a major ophthalmic operation. His skill in this must be gained in the school of experience, which was expensive alike to surgeon and patient.

It was undesirable to attempt to teach operative work to all the young men passing thru the hospitals seeking ophthalmic training; it would be unjust to both patients and the hospital to attempt to do so. Ophthalmic surgery differed from all other surgery in that there was, in it, no gradual road to competence; one could not allow a man to begin an operation, such as that for cataract, and, if he got into difficulties, step in and set things right. The mischief was already done—and men had only two eyes.

The present position, he declared, was not fair to the public, nor to the honor of ophthalmic surgery; he would have ophthalmic operations in fewer hands than at present. This would mean not only a higher standard of operative skill, but enterprise and progress in surgical treatment. It would then be possible to have private ophthalmic hospitals, equipped for these special operations; this would be much preferable to having to depend on nursing homes, where eye operations were infrequent, and the nursing means not satisfactory.

In place of the Fellowship he would have an ophthalmic qualification, and it should be possible to qualify either medically or surgically; for the latter there must be evidence of operative skill. For the ordinary medical qualification, men were required to have attended 20 or 30 cases of midwifery: was it too much to ask that before a man was admitted as an ophthalmic surgeon he should show some operative skill in this department?

Physicians could be appointed to ophthalmic hospitals at once: they

should attend out-patients, and have beds at their disposal. They should see all classes of cases, but should be relieved of all operative work. Both physicians and surgeons would benefit greatly by constant close association, and the system he advocated would redound to the credit and advancement of ophthalmology.

The paper will be debated at the next meeting of the Section.

H. DICKINSON.

SOCIETY OF SWISS OPHTHALMOLOGISTS.

TWELFTH MEETING.

Basel, July 12, 13, 1919.

Abstract translation from the *Correspondenzblatt für Schweizer Aerzte*, v. 44, Oct. 30, 1919, by Dr. M. W. Fredrick.

Detachment of the Retina.

J. GONIN, of Lausanne, referred to his former studies on enucleated eyes, which led him to establish four causes of retinal detachment: traction, soulèvement (pushing up), distension, and depression thru diminution of the size of the globe. Almost all the cases due to the last causes, and the great majority due to the second cause do not call for any special therapeutics, inasmuch as they are secondary phenomena of small importance, show little tendency to increase, and disappear with the primary causes (severe trauma, suppurating cyclitis, intraocular tumors, etc.)

This leaves the first cause, traction, to be considered. Here we have the cases which are called idiopathic, in which the retina seems to be the only part involved, but in which alterations in the uvea and vitreous have always preceded the retinal change. One should always bear in mind that:

1. The principal factor in retinal detachment is the traction exerted on the retina by the vitreous;

2. The liquid found behind the retina communicates with that of the vitreous by one or several tears in the retina;

3. A detachment beginning in the upper part of the retina tends to gravitate to the lower part, and when it is in the

lowest part of the retina shows the least tendency to spread.

4. A reapplication of the retina is permanent only when the traction exerted on the retina by the vitreous has ceased, or is counterbalanced by a sufficient adherence of the retina to the choroid. Such a reapplication can be conceived of only after the closure of the tear or tears in the retina.

5. Treatment should be directed towards favoring the displacement of the detachment from the upper to the lower parts of the retina, reducing to a minimum the traction of the vitreous, facilitating the reapplication of the edges of the tears, and the development of an extensive chorio-retinal adhesion.

This proves the futility of those measures whose sole purpose is the evacuation of the retroretinal fluid or its absorption, (scleral puncture, aspiration or drainage of the fluid.) The only virtue in *Samelson's* treatment is the immobilization of the globe. The dorsal decubitus favors the downward displacement of the detached area. The utility of subconjunctival injections and of thermocautery is doubtful, unless they effect an adhesive choroiditis of sufficient intensity to enable the retina to overcome the traction of the vitreous after evacuation of the fluid. The treatment of Deutschmann, while theoretically logical, offers so many technical difficulties that it is almost impossible to carry it on to a successful result.

DISCUSSION: Siegrist, of Bern, called attention to the fact that the studies of Leber, and also of Gonin, had established that the idiopathic detachments of the retina, such as we most often meet in high myopia and after blunt trauma, are, in the majority of cases, the sequels of peripheral tears of the retina. These tears can be seen very often, if one takes the trouble to examine the periphery after dilating the pupil. As we know that they are often to be found in the upper temporal quadrant, seating the patient high will facilitate the search.

As to the genesis of these tears we have Gonin's theory of primary chorio-retinitic foci in the periphery of the fundus, which lead to adhesions of the vitreous as well, the shrinking of which

produces the folding, and tears in the retina. Leber, however, thinks that in high myopia primarily, and in traumata secondarily to the tears produced by the injury, degenerative processes in the retinal periphery come about, leading to a proliferation of cells, which probably arise from the pigment epithelium, but also include vitreous cells. These cell masses constitute flat circumscribed bodies lying on the internal surface of the retina, and their shrinking produces the folding and tears of the retina, thru which the fluid enters behind the retina and pushes it in. The proliferating cell masses, according to Leber's newest views, may even produce buds, which detach themselves and wander toward the more central parts of the retina, where they produce the same results as the parent masses. This would dispose of the strands in the vitreous, something which, by the way, has never been seen with the ophthalmoscope, and would prove the uselessness of trying to divide these strands surgically.

The treatment of detachment of the retina, a condition in which but 5% of permanent cures have been effected (Vail's figures for 2,500 cases was 1/10%) is a thankless undertaking. Siegrist introduces the positive needle thru a large incision in the conjunctiva and pushes it thru the sclera into the subretinal fluid; 3 M A are passed for 2 to 3 minutes, and this is followed by scleral trephining. One of Siegrist's cases was permanently cured in this way; in a second case, in which the cure has lasted seven years, scleral puncture, repeated cauterisation of the sclera, dorsal decubitus and pressure bandage for four weeks and with three injections of 10% salt solution, were the means used. In a third case, now one year old, there was high myopia and extensive detachment, but a cure was effected with dorsal decubitus and pressure bandage, with twenty subconjunctival injections of 4% salt solution. In all Siegrist had twenty operative cases.

Experimental Cataract from Ultrared and Red Rays.

VOGT, Basel, supplementing his former studies which showed that the short ul-

trared waves of our artificial light sources reach the lens and retina in even greater amounts than the visible light, succeeded with the apparatus, which he describes very well, in producing a total cataract in the intact lens of an adult black rabbit by a three hour exposure. In a young rabbit the upper part only of the lens showed opacity, due, supposedly, to the cone of light impinging in this part principally.

The opacity is situated partly beneath the capsule, but mainly in the first zone of discontinuity, and affects the anterior and the posterior parts of the lens equally. The two areas of opacity are connected. Another pigmented rabbit showed opacity in the anterior upper part of the lens. In albinotic rabbits these effects could not be produced in the time mentioned above.

From his findings Vogt deduces that glassblowers' cataract is due to the ultrared and red rays; not, as was formerly assumed, to the ultraviolet rays. He hesitates to draw conclusions as to the etiology of senile cataract from his findings, and says that they do not explain the occurrence of cataract in India and other hot countries at an earlier age (if such be the case). Neither does he feel able to say that cataract may not be caused by other than ultrared rays, for instance by visible rays. A further effect of exposure to this ray mixture is the bleaching of the pigment of the pupillary edge; after a few weeks one could see the pigment scale off and fall into the anterior chamber. A regular accompaniment of the exposure is the paralysis of the sphincter of the iris, and the whitening of the hairs of the brow.

Parenteric Injections of Milk In Eye Diseases.

F. STOCKER, Lucerne, gave some of his results in treating various eye diseases with injections of milk. Three to twelve grams of cow's milk which had been cooked for four minutes and free of coagulum were injected thru the abdominal wall which was raised in a high fold between the pelvic rim and the costal border. The patient is then put to bed and kept in bed until the fever sub-

sides, which it does as a rule on the third day.

Musy pasteurizes the milk for 15 minutes and injects 5 c.cm. deep into the gluteal muscles every second to fourth day until he gets results, which means two or three injections. Fever as high as and above 39° . Pains in the head and the site of the injection, are the rule, but these are more than offset by the relief afforded the eye. The pain, photophobia, injection and swelling disappear with such rapidity as to merit the word magic. In those patients in whom rheumatic pains were present, these also disappeared within forty-eight hours.

In iridocyclitic processes which seem to be making no progress, these injections are of great value. In iridic processes there is rapid abatement of the inflammatory symptoms, and the pupil dilates

but they acted very promptly in iritis following contusion of the bulb. No increased diuresis was observed, and diarrhea was noted in one case only.

M. W. F.

PITTSBURGH OPHTHALMOLOGICAL SOCIETY.

November 3, 1919.

Paresis of Right Superior Rectus with Spasm of Left Inferior Oblique.

DR. W. E. CARSON reported the case of Mrs. F., age thirty-five, who sought advice because of an inflammation affecting the left eye and persistent headaches. There was some photophobia, and she was quite nervous with indications of impending neurasthenia. There had been a slight "cast" in the left eye since childhood, which had re-



Fig. 1.

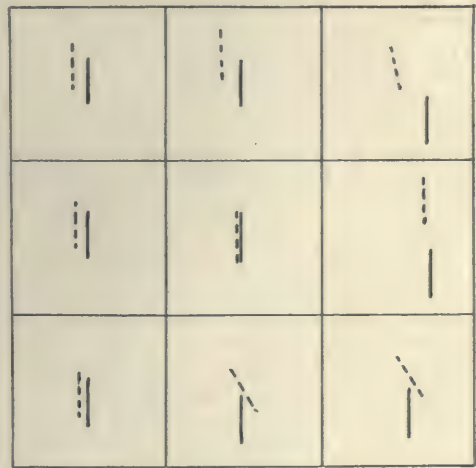


Fig. 2.

Diplopia from paresis of right superior rectus with spasm of left inferior oblique (Sarson's case). Fig. 1 shows displacement of the image, the false image shown by ring, true image by solid black circle. Fig. 2, inclination of images, false image belonging to right eye shown by broken line.

quickly, and the corneal defects show an early vascularisation. In luetic iritis, with marked exudation and the formation of synechiae, the injections seemed to assist the systematic treatment, in as much as the ciliary irritation became less, and the synechiae which had resisted mydriatics ruptured.

In chronic irido-chorio-cyclitis, blennorrhoea neonatorum, and tuberculous irido-cyclitis the injections were of no value,

cently become more noticeable with a tendency to diplopia, at times. Had worn glasses from her 22nd to 26th year.

On examination it was noticed that the head was tilted toward the right shoulder and slightly rotated to the right, with chin up and to the left. Patient is unconscious of the fact, and only realizes that her head is in such position when she notices it in her pic-

tures—friends have told her that the condition is becoming worse. There is marked conjunctival injection of the left eye. Smear for bacteria was negative.

The right is the fixing eye. On following an object up and to patient's right, the left eye turns up and in. In other portions of the field the coordination appears to be perfect. The phorometer with Maddox rod indicates left hyperphoria of twenty degrees and exophoria of four degrees. With a red glass over one eye and patient observing a luminous rod before the screen the maximum vertical separation was found to be in the right horizontal quadrant. A plus cyclophoria was also indicated.

A diagnosis of congenital paresis of the right superior rectus with over-action of the left inferior oblique, right eye fixing, was made. But it was thought best to see what degree of relief might follow correction of the axial ametropia and the following correction was made:

R. $+1.00 \text{ Cyl.} +0.50 \text{ ax. } 45^\circ$

L. $+0.75 \text{ Cyl.} +0.25 \text{ ax. } 140^\circ$

The patient reported in three weeks that she was more comfortable, but still having headaches particularly in region of left eye. Left hyperphoria of twenty degrees was again found.

The patient was referred to Dr. W. C. Posey who confirmed the diagnosis and did a tenotomy of the left inferior oblique. Dr. Posey wrote: "Immediately after the operation the patient experienced a relief in the tension which had been always present in the muscles of her neck, and already I find that she holds her head a great deal straighter." Her correction was revised to include a prism of three degrees base up over right eye, three base down over left eye. A week after the operation there was present left hyperphoria of nine and a half degrees (reduced from twenty), and the patient reported a marked sense of well being, saying she had never known what it was to feel so free. Is impressed with the fact that this sense of removal of restraint and rigidity extends thruout her entire body.

Six months later she reported that her eyes became tired after reading. A test of her refraction showed a change in the axis of the cylinder required by the left eye, from 140° to 160° . Left hyperphoria as before nine degrees. The cylindric correction was changed, with an addition of one degree to the strength of the vertical prism (making a total of 7°), with marked relief of symptoms. The patient has been comparatively comfortable since.

The operation was done thru an incision in the lower lid over the insertion.

Dr. Posey gives three indications for tenotomy of the inferior oblique one of which is as follows and would apply to the case here reported:

"Partial paralysis or even slight insufficiency of the superior rectus of the other eye when, owing to fixation being performed by the latter, the fellow develops a spasm of the inferior oblique so pronounced as to give rise to a disturbing (even if unnoticed) diplopia, a disfiguring upshoot of the affected eye, or a lasting torticollis. Such an indication is furnished especially by congenital cases."

Cataracta Nigra.

DR. EDWARD STIEREN showed a specimen removed from a myope of 15 D. who had been under observation for nineteen years.

Sept. 5, 1900, the first examination
R.—16 D.S.—3.50 D. Cyl. 150° V.
=2/32; L. 15 D.S. V.=6/32.

Numerous floating and fixed opacities and extensive staphyloma posticum, are present in each eye. The nucleus of each lens is well defined and with reflected lateral light seems darker in color than the cortex.

The nucleus of each lens has gradually grown larger and darker. Observations during the past few years have been made at about yearly intervals because of the patient's residence in California.

October 4, 1919, a combined extraction was performed on the left eye, vision being little more than light perception. A large section was made and

the lens delivered without loss of vitreous and practically in its entirety. There remains, however, in the anterior chamber considerable bunched up capsule, which will be needled shortly.

Black cataracts are really not black in color but are a dark mahogany brown. A number have been examined chemically and spectroscopically but never have any of the blood pigments been found, nor iron in any form.

It has been observed that dark cataracts developed much more slowly than light ones; and that a black cataract never becomes matured in the ordinary sense of the word, since it is not a cataract proper but a sclerosis of the entire lens which has become converted into a hard, dark-brown, translucent mass. Such lenses are always large and hard but can be operated upon with good results if a large section be made. They usually occur in myopes. The capsule is always much thickened, invariably requiring a secondary needling. Dr. Stieren had seen one other case, similar to this in every respect.

Hysteric Ptosis.

DR. EDWARD A. WEISSER reported a case of right ptosis (nonparalytica), in a man 25 years of age, the condition existing a little more than a year. With this ptosis there is a peculiar partial paralysis of the right superior rectus at times. Muscle balance taken with phorometer does not show any deviation from the normal, there being orthophoria in all directions, yet under cover the left eye turns slightly upward at times. The ptosis is not always present but at times the lid will twitch and then fall and remain down for varying periods. There is no pathology in either eye in any form. No history of trauma or syphilis. At various times Wassermanns have been taken and they were always negative. His refraction under cycloplegic is only +.50 sp. A diagnosis of hysteric ptosis was made and confirmed by Dr. Diller who saw the case later.

A Typical Gonorrheal Ophthalmia.

DR. V. E. VANKIRK reported that Mrs. P., when first seen Oct. 20, 1919, had a violent mucopurulent conjuncti-

vitis with cloudiness of the cornea. The eye became inflamed two days before, but otherwise the history was negative. She was sent to St. Joseph's Hospital and bacteriologic examination made by Dr. Rockman.

He reported Gram-positive, extracellular diplococci found on several slides.] The eye was flushed with cold 1-3000 cyanid of mercury, cold compresses of Oschner's solution employed for 10 minutes, and atropin sulph. 1% instilled, every three hours. Under this treatment the secretion became less abundant but the corneal involvement more marked.

On Oct. 26, 1919, a typical Gram-negative, intracellular diplococcus found, and the husband reported a urethritis. At no time has this case shown the usual velvety red conjunctiva or the typical creamy pus. Nor have the usual red edematous lids been noted.

Phlyctenular Ophthalmia.

DR. E. E. WIBLE reported the case of Miss C., age 12 years. Admitted to hospital Sept. 21, 1919, suffering from extreme photophobia, was led in as if blind. Also complained of slight pain in R. lower abdomen.

Patient stated had "Flu" in October 1918, followed, one week after recovery, by red and painful eyes. This condition has been continuous since then. Has been under the care of two oculists. L. eye has been bandaged during the last five months, patient being told the eye was blind. Was on crutches for three months last spring on account of arthritis of the lower extremities. Family history negative; tonsils slightly enlarged, general condition good. On examination there were found phlyctenular ulcers, limbus, R.; and deeply infiltrated opacities of the lower half of cornea of L.; ocular and palpebral conjunctivitis, blepharospasm, extreme photophobia of both eyes and fissures of the outer canthi.

Treatment consisted of the usual remedies of atropin, yellow ointment and syr. ferri iodid. Bandages were removed from eyes, smoked glasses applied, patient gotten out of bed and with considerable difficulty was gotten

out into the hospital yard as rapidly as possible, with the result that in three weeks the patient was entirely well and with correction had vision of 15/15 in R. eye and 15/50 in L. eye. Following this her appendix was removed, which was found but slightly infiltrated at the tip. The internist also contemplated having a tonsillectomy done.

H. H. TURNER,
Reporter.

COLLEGE OF PHYSICIANS OF PHILADELPHIA, SECTION ON OPHTHALMOLOGY.

OCTOBER 16, 1919.

DR. WILLIAM T. SHOEMAKER, Chair-
man.

Unilateral Exophthalmos with Bilateral Ophthalmoplegia and Neuritis.

DR. WM. ZENTMAYER showed the following case: M. B., aged ten years. About three weeks ago there was sudden "swelling" of the right eye, with pain over the eye, lasting for one week. There was some vomiting and occasional diplopia during the first week. She has had measles, chicken-pox and whooping-cough. No convulsion or injury.

The right eye was proptosed 7 mm. and there remained only a very slight upward rotation of the eye. Pupil 4 mm. Left eye very slight upward, downward and inward movements. Pupil, 3.5 mm. Both eyes turned to the right. Face carried to the left and up.

R. E., 6/6 pt. L. E., 6/5. Illit.

R. E., upper-inner border of papilla prominent. Veins greatly dilated and tortuous. L. E., upper-nasal border of p. veiled. Sup. n. v. enlarged.

X-ray of sinuses and head negative. Wassermann and tuberculin test negative. Several conditions were considered: cavernous sinus thrombosis, posterior ethmoiditis, growth in the anterior portion of the brain pushing down the roof of the orbit and invading the oculomotor centers.

The absence of venous stasis, thrill and bruit was against, and the presence of unilateral exophthalmos with bilateral

involvement of the muscles and optic nerve were for cavernous sinus thrombosis.

The apparent suddenness of the exophthalmos without previous symptoms of any kind, with a stationary condition, was against a neoplasm. The probable cause was cavernous thrombosis. An exploratory incision will be made to determine whether there is an orbital condition.

Dr. Rhein, who made the neurologic examination, believes the diagnosis rests between acute external ophthalmoplegia and cavernous sinus thrombosis.

Proliferative Chorioretinitis with Partial Avulsion of Optic Nerve.

DR. ZENTMAYER presented an adult male, who five years ago suffered a self-inflicted pistol shot wound of the head. The bullet entered the skull on the right side, just above the zygomatic arch, behind the external orbital rim and passing thru both orbits lodged in the anterior fossa of the brain, where it remains. The fundus of R. E. shows a mass of new-formed connective tissue overlying the position of the disc and extending upward several d. d. and forward into the vitreous 5 or 6 D. The lower and temporal borders are rounded and there is a broad band of similar tissue extending out toward the temporal region. There is considerable pigmentation of the borders and surface of the mass. Emerging from the edge of the mass and curving about its rounded border at several points there were vessels, some of which were new-formed, others the vessels of the retinal circulation.

On the left side there was a complete ptosis and paralysis of the external rectus. There were the sequelæ of iridocyclitis. V. = L. P. A Tansley-Hunt ptosis operation was done to relieve the patient of the adhesive strip he had been wearing to elevate the lid.

Different interpretations of the fundus picture might be given, but Dr. Zentmayer considered it to be a proliferative retinochoroiditis, with partial avulsion of the optic nerve. Similar

cases are reported and pictured in Langerhans' and also in v. Szily's atlas of *Fundus Lesions of War Injuries*.

DISCUSSION: Dr. Holloway stated that this patient had been seen by him several years ago in the dispensary of another institution. At that time the right eye was blind and presented the enormous areas of organized tissue that have just been described by Dr. Zentmayer. The position of the disc could be determined by the vessels curving toward it, altho the tissue covered them for some distance below the disc. When first seen the patient saw hand movements with the left eye. With the ophthalmoscope only a faint pinkish reflex could be obtained down and out and large floating masses could be seen which were regarded as a probable detachment of the retina. Much to his surprise, during the course of the next six months, this eye cleared up to such an extent that he acquired 1/15 vision and certain fundus structures could be vaguely seen. At the present time the vitreous has again become much involved and presents the appearance not unlike that which was noted at the time he was first seen.

Dr. Holloway stated that he had seen two other cases of similar gunshot wounds, in one case both eyes being destroyed.

Foreign Body in Sclera.

DR. WM. T. SHOEMAKER AND DR. HUNTER W. SCARLETT (by invitation) presented the case of a male steel-worker from Ohio, who was struck near the inner angle of the left eye by pieces of case-hardened steel, September 19, 1919. The shop physician saw no evidence of a foreign body, and as the vision was good, he declared the eye uninjured. Patient resumed work but a few hours later complained of pain and blurred vision. The following morning the lids and conjunctivæ were edematous. After reexamination three pieces of steel were removed from the lower cul-de-sac by means of an applicator.

One week later the diagnosis of intraocular foreign body was made and the patient was sent to Canton for magnet extraction. The doctor in Can-

ton localized a foreign body in the upper part of the eyeball, applied the magnet without result and told the patient that it was nonmagnetic. He was then discharged, with instructions to return to work and disregard the pain.

The patient then came to Philadelphia and consulted Dr. Scarlett, October 4. X-ray at the Lankenau Hospital showed a small foreign body embedded in the lower temporal portion of the sclera. External examination shows a pin-head sized perforation of the iris, 1 mm. from the pupillary border, about 9 o'clock, and a stringy horizontal opacity in the upper cortex of the lens. With the ophthalmoscope the F. B. can be seen as localized. There is a raised area of choroidal disturbance and a tiny detachment of the retina.

The vision of the eye is 20/50. The giant magnet was tried to its capacity. The traction caused a good deal of pain, but was not sufficient to liberate the F. B.

Here then was an eyeball with a piece of steel embedded in the sclera, which would not yield to magnetic persuasion. The damage done by transit of the foreign body was comparatively little and the eye is quiet and has a high degree of usefulness.

In Dr. Shoemaker's opinion further attempts at extraction are not indicated and the eye can safely be let alone. There was a time when he demanded the foreign body or the eye, but to take both in this case seems to be, at the present time, unjustifiable.

DISCUSSION: Dr. Holloway stated that the appearance of the fundus at the site of the foreign body reminded him very much of three cases he had seen a number of years ago. In making these remarks he had no intention of reflecting upon the accuracy of the x-ray examination that had been made of Dr. Shoemaker's case, but he merely wished to point out that he regarded accurate localization in such cases as necessary before ultraradical procedures were adopted. He then referred to one case in particular in which this same picture had been caused by choroidal pigment, which had been re-

garded as the foreign body until an accurate localization demonstrated that the piece of steel was immediately behind the sclera. He also pointed out that under such circumstances, where the wound of exit is in the macular region or near it, a stellate figure may be formed having the same appearance as a stellate figure seen in cases of nephritis and brain tumor.

Cyclodialysis for Glaucoma with Infected Conjunctiva.

DR. G. E. DE SCHWEINITZ, after a brief description of Heine's operation and the usual indications and results, referred to a case of subacute glaucoma in a man whose other eye was blind. The tension was very high, above 60 mm., the cornea steamy, and there was a persisting conjunctivitis which, on examination, yielded a pure culture of *Staphylococcus pyogenes aureus*. Miotics reduced the ocular tension but did not control it. A peripheral iridectomy, or corneoscleral trephining, or Lagrange's operation, seemed to invite disaster in the presence of such an active staphylococcus conjunctivitis. After as thoro cleansing of the conjunctival sac as was possible a cyclodialysis was performed, and immediately the small scleral incision cauterized with carbolic acid. The chamber deepened, there was no reaction of any consequence, miotics were continued, and at the time the patient was exhibited, nearly five months after operation, corrected vision was 6/9, the field had markedly widened, and the tension as measured with the Schiötz tonometer was 18 mm. Thus far it had not been found necessary to repeat this operation or to perform any other one. It would seem, therefore, that, even though it might prove of only temporary benefit, cyclodialysis followed by cauterization of the scleral incision was worth trying in conditions such as those described.

In a second case, in a Hebrew woman, the right eye was blind from staphyloma, the left eye in a state of advanced subacute glaucoma, with steamy cornea, obliterated anterior chamber and vision reduced to shadows. On both sides there was dacry-

ocystitis; the canaliculi had been slit. Tension was very high; it was not possible to measure it accurately with the tonometer. After a course of miotics, which reduced somewhat the tension, a cyclodialysis was performed, exactly as in the preceding case. As soon as the spatula was withdrawn the anterior chamber was, altho shallow, reestablished. Within several days the tension was lowered, to about 30 mm. Subsequently it began to rise, the cyclodialysis was repeated, with the same good result, and since then, a few weeks only, it has remained normal and vision satisfactory. Treatment of the duct has checked all discharge, and cultures are free from pathogenic organisms. It is proposed now to try either a corneoscleral trephining or else a scleroidectomy. Dr. de Schweinitz suggested that cyclodialysis in cases of practical obliteration of the anterior chamber and very high tension should prove to be a useful procedure preparatory to a more formal operation, in place of a posterior sclerotomy.

DISCUSSION: Dr. Zentmayer said when cyclodialysis was introduced he performed a series of operations on various types of glaucoma. On the whole the immediate results were good. As the operation seemed more adapted for the preservation of sightless glaucomatous eyes, and for secondary glaucoma with marked sclerosis of the vessels as in retinal hemorrhages and thrombosis of the central vein, the operation was later limited to such cases. It seems particularly well adapted to the second class. As has been pointed out again by Dr. de Schweinitz, the reduction of tension produced by the procedure is sometimes delayed for forty-eight hours, or, in other words, it comes on so slowly that often no noticeable reduction occurs within this time.

Dr. Holloway stated that over a year ago a patient had come to him with a glaucomatous eye, with vague light perception and practically complete obliteration of the anterior chamber. Doubting whether a cyclodialysis or a posterior sclerotomy would be of avail in securing any appreciable depth to the anterior chamber, he trephined the

sclera well back from the corneoscleral junction between the superior and external rectus and carried a narrow knife into the vitreous chamber. The tension was somewhat reduced for eight or nine days and there was a very slight deepening of the chamber, but the results were not permanent. He mentioned this case at this time, in the hope that others might try the same procedure in suitable cases.

Treatment of Hypopyon Keratitis.

DR. DE SCHWEINITZ reported the case of a workman, about fifty years of age, who came with advanced hypopyon keratitis of some weeks' standing, following a slight corneal injury. The hypopyon filled three-fourths of the anterior chamber, and above it there was a small abscess within the corneal layers. Cultures from the ulcer yielded a pure return of "diphtheroids"; no pneumococci or streptococci were present. The usual treatment, curettage, cauterization (trichloracetic acid), ethylhydrocuprein, dionin, iodoform dusting, etc., failed to check the disease. Fifteen hundred units of antidiphtheritic serum were injected. Within thirty hours an improvement was noted, further stimulated by additional serum injections. All the ocular pathologic conditions subsided (atropia was constantly used and frequent boric acid irrigations, but nothing else), and at present (some months after the treatment) the eye is quiet, the cornea, however, partly covered with leucoma.

Dr. de Schweinitz, referring to the notable favorable effect of the antidiphtheritic serum in this case, spoke of the recommendation which had been made by Darier, Fromaget, Zimmermann and other observers, of its use in infected corneal ulcers, and discussed some of the views which had been expressed in regard to the pathogenicity of xerosis bacilli in certain circumstances and of the relation of those bacilli to pseudodiphtheritic bacilli. He doubted if the ulcer in the case reported had been the result of the "diphtheroids," which probably should be regarded as secondary and without definite etiologic significance. He felt, however, in view

of the results in this case, and in one of the recent cases which he briefly reported, and in view of other observations to which he had alluded, that trial of this serum in cases of infected corneal ulcer not yielding promptly to the usual measures, including autogenous vaccine therapy, should be made. He had not employed in this case thermotherapy, either by Weeker's method or with the thermophor of Shahan.

"Petit Mal" Benefited by Proper Glass Correction.

DR. P. N. K. SCHWENK related the case of M. T., aged thirty-four years, who was referred to him in September, 1918, with a history of having convulsions in infancy, while teething, followed by *petit mal* until her fifteenth year, when nocturnal convulsions began. She was then put on "bromides." For eighteen years (during the latter fifteen years of which she has worn glasses) she has had *petit mal* attacks and convulsive nocturnal seizures each month ten days before menstruation. For ten days after menstruation she is usually free. The attacks are preceded by an aura, a sensation in the spine between the scapulæ rising to the back of the head.

For six years she had frequent pains over the left eye and in the occipital region. No loss of bladder control. Her malady and the constant bromid medication made it impossible for her to concentrate her attention long enough at a time for her to study to any advantage, and so she left Bryn Mawr College without graduating.

So for eighteen years she has been depressed, gloomy and fatalistic, unable to carry on any line of work or realize her ambition. During these years she has taken bromides, in moderately large doses, twenty-six days out of each month. She came to Dr. Schwenk on September 2, 1918, wearing:

R.—2.75 s. \bigcirc +5.25 cyl. axis 90°

L.—2.00 s. \bigcirc +5.25 cyl. axis 80°.

Cornea and pupils normal; apparent parallel fixation; muscular movements normal; eye-grounds negative. Findings under a mydriatic (duboisin) were:

R. 20/c — 2.50 s. \odot +4.00 cyl. axis $100^\circ = 20/20 - 2$.

L. 20/cc — 3.25 s. \odot +5.50 cyl. axis $80^\circ = 20/20 - 2$.

She was ordered:

R.—2.75 s. \odot +.400 cyl. axis 100° .

L.—3.50 s. \odot +5.50 cyl. axis 80° .

She has worn this correction since September 6, 1918.

On December 13, 1918, Dr. Schwenk had the following report: The glasses relieved the left supraorbital and occipital headaches at once. She soon found the ordinary usual doses of bromides made her unusually sleepy, and began to reduce them with considerable trepidation. Her last major attack was September 6, 1918. She ceased taking bromides December 1. Has menstruated since and has had no attacks. She feels less depressed and can read or sew for several hours without trying her attention.

For eighteen years—although she had occasional provocations—she could not weep, as there were no tears. Recently she has been able to weep. The improvement is unquestionably due to the proper refraction, as she dates her betterment from the day she put on her new glasses.

Improved Method for Enucleation.

DR. FREDERICK KRAUSS read a paper which will be published in full in this journal.

COLORADO OPHTHALMOLOGICAL SOCIETY.

October 18, 1919.

DR. E. M. MARBOURG presiding.

Penetrating Injury of Eyeball.

E. R. NEEPER, Colorado Springs, presented a mechanic aged 25 years whose right eye had on September 11 been penetrated by a piece of steel, which passed thru the cornea and iris and which, after localization with the x-ray, had been removed with the giant magnet thru an incision below the internal rectus. There were bands, apparently of scar tissue, in the anterior vitreous. Should an effort be made to sever these bands, in order to avoid the risk of detachment of the retina? The vision was of large objects only.

DISCUSSION: Melville Black, Denver. A single broad band might be cut, but in this case the bands do not seem to be definite enough.

C. E. Walker, Denver, was not disposed to recommend any further operative procedure on the eye; and several other members expressed themselves in favor of leaving the eye alone.

Recurrent Iritis? Tumor.

E. R. NEEPER, Colorado Springs, presented a woman of 40 years, who in the course of the past year or so had had several attacks of iritis in the right eye. The last attack, in September 1919, had left permanent posterior synechia with an elongated pupil, thru which a white mass could be seen well forward in the anterior vitreous. The mass had been much smaller when first seen and at that time had shown as two smaller masses on the nasal side. At the time of demonstration the iris was crowded forward more than it had been nine days previously. The tension was normal. The patient had first noted a film coming over the sight of this eye during the late summer of 1918. Her father had died of cancer. Enucleation had been advised.

DISCUSSION: Melville Black, Denver, while unable to form an opinion from the mere appearance of the eye at the present time, felt that Dr. Neeper's previous opportunities for study of the eye made it necessary to accept his judgment as to the necessity of enucleation.

W. H. Crisp, Denver, remarked that the eye was either normal or soft in tension, whereas in a tumor at such an advanced stage one would expect an increase of tension. He suggested that possible causes, especially in the line of focal infection, should be investigated before removing the eye.

Melville Black and D. H. Coover, Denver, said that a relatively low tension might frequently occur in the earlier stages of tumor.

D. H. Coover and W. C. Finnoff, Denver, suggested the possibility of tuberculous infection of the eye, and the diagnostic use of tuberculin; Dr. Finnoff adding that in the presence of suspected tuberculosis of the retinal vessels it was especially necessary to

use tuberculin with a great deal of caution, because of the danger of doing more harm than good.

Penetrating Injury with A Nail.

F. E. WALLACE, Pueblo, presented a man who had been struck in the right eye by a six-penny nail, which had penetrated the sclera 4 or 5 mm. to the temporal side of the iris; making a linear wound about 4 mm. in length, which extended from the iris backward. There was some loss of vitreous, and the accident was followed by a violent reaction. The vision had fallen by the end of the fourth day to 20/200, but at this time had increased again to 20/80. There were large floaters in the anterior vitreous immediately behind the lens. Should the eye be enucleated? The treatment had included atropin, heat, dionin and the internal use of sodium salicylat.

DISCUSSION: Melville Black, Denver. The floaters are merely the remnants of old hemorrhages, and the eye is doing pretty well. The period of greatest danger is past. If the patient is willing to take some chance, I should try to save the eye. There is a good chance of its becoming a fairly useful eye.

Retinitis Pigmentosa.

E. M. MARBOURG, Colorado Springs, presented a typical case of retinitis pigmentosa, with night blindness and contracted fields, in a patient who was deaf and dumb.

WM. H. CRISP,
Secretary.

ABSTRACTS.

Charlin, C. Orbito-Cranial Syphilis
Ann. d'Ocul., 1919, v. 156, p. 185.

The author divides the orbital lesions into two classes, those in the anterior portion, easily diagnosed and treated, and those lying deep in the orbit, hard to diagnose and of unfavorable prognosis. His paper deals with the latter form. The lesions are usually tertiary, involving the orbital walls and frequently invading the neighboring sinuses and brain. The symptoms vary according to the location and

neighboring structures involved. They are (a) visual, amblyopia or amaurosis; (b) pupillary, diminution or loss of reflex to light or accommodation; (c) ophthalmoscopic, papillary venous congestion, papillary edema, optic neuritis, and in the last stages, papillary atrophy; (d) motor, paresis or paralysis of ocular muscles and upper lid; (e) sensory, ocular, orbital and periorbital neuralgia, anesthesia, hyperesthesia; (f) orbital vascular, conjunctival hyperemia, conjunctival chemosis, edema of the lid, and epiphora due to lacrimal hypersecretion; (g) trophic, keratitis neuroparalytica, cutaneous lesions of the lid and neighboring regions; (h) proptotic, lateral and exophthalmic; (i) inflammatory, orbital phlegmon. Identical lesions may manifest themselves under different symptomatology. For example, in one case a gumma of the orbito-cranial region showed only a gradual loss of sight, in another it produced very violent orbital and periorbital neuralgia, followed in three weeks by visual disturbance, while in a third case the principal symptom was exophthalmos. The author reviews the anatomy of this region, and explains why lesions at certain points produce one set of symptoms, as a rule, and at another a different set. Development of gumma within the orbital cavity causes increase in its contents and is followed by exophthalmos, whereas extraorbital gumma does not increase contents, so that there is no exophthalmos. Functional troubles are dependent upon the location of the inflammation. (a) In the region of the optic canal—the nerve is involved, resulting in decrease in vision with decrease or suppression of the pupillary reaction to light. The only ophthalmoscopic changes in the early stage is a retinal venous congestion; later the disc becomes white and atrophic. (b) In the region of the sphenoidal fissure—(1) multiple muscular paresis, (2) anesthesia, hyperesthesia and neuralgia; (3) palpebral edema, conjunctival chemosis, ocular venous congestion. The author describes ten cases with a comparative study of the clinical observations.

C. L.

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VOLUME THREE.

Those in charge of the AMERICAN JOURNAL OF OPHTHALMOLOGY take up the work of its third year holding steadily to the purpose to make it the most widely useful ophthalmic journal it is possible to publish. To the special student it will be indispensable on account of its bibliographies and indexes and its digest of the world's literature, as well as the fact that it contains the most important articles on certain subjects. For the isolated practitioner of ophthalmology it will keep and extend the broad scope and organization, the readiness to publish the things he wants to read, that make it the one journal for those who take but one relation to this branch of medicine.

The YEAR BOOK portion will this year be published as a separate supplement quarterly. It will preserve much the same form as heretofore and will be somewhat more full and complete. The new arrangement makes easier the expansion of both journal and supplement; which is inevitable, altho it will be gradual, and must be accompanied more and more by careful sifting of the

matter admitted to our pages. Growth in size must be paralleled by improvement in the literary form and the scientific value of contents.

The development of our department of SOCIETY PROCEEDINGS is being taken up as one of the most important parts of our work; and it will be pushed by one of our active collaborators recently released from war service. More and more, society meetings come to be the channel for the expression of the newest thought, the presentation of the most recent discoveries, and the reports of their transactions a most important part of the literature. We shall push this feature of the journal, both because it gives so much of value to our readers for the pages devoted to it; and because in encouraging the growth, regular meeting, and scientific work of ophthalmologic societies we are serving most efficiently the interests of the great mass of ophthalmologists.

In the list of our collaborators new names will appear from time to time thruout the year, and in our pages the evidence of their activity. This

growth will be most apparent in the more distant countries, for wherever the English language is read the AMERICAN JOURNAL OF OPHTHALMOLOGY is taking its place among the standard scientific journals of the world.

E. J.

WASTE OF ENERGY IN OPHTHALMOLOGY.

Every year when abstracting and digesting ophthalmologic literature for the chapters of the Ophthalmic Year Book, the reviewers cannot fail to be impressed with the very considerable waste of energy and time incurred by many authors, who claim to have devised "new" ideas, new methods or new operations, by their entire lack of information of what other men have done before on the same, or allied subjects.

Perhaps the lack of sufficient facilities, especially in the line of good ophthalmologic libraries in which to study and saturate themselves with the subject, on which writing is intended, is at the bottom of the trouble.

University towns in Europe, even small ones, have generally good libraries, with sets of nearly all special journals, monographs, large encyclopedias and ordinary text books. It would be in the interest of medical education and research, that new libraries should be formed in each State of the Union, and that the old ones be provided with good encyclopedias and also sets of special journals, published in this country and abroad.

Younger authors, when trying to write on one special subject generally go for information to well known text books, and consider "new" those matters which are not dealt with in those books. In doing this they forget that science in the process of formation finds its way to the medical public mainly thru the journals, and that to be thoroly acquainted with what others have done before, it is necessary to search the former for many years past. The use of large encyclopedias is a necessary first step, the subject being

treated there in an exhaustive and complete manner with bibliographic references appended. In many cases even the reading of the papers or monographs quoted is imperative, when first hand or detailed information is needed.

For bringing the subject up-to-date, a thoro search in the indexes of many files of ophthalmologic journals, year after year, would be necessary, and after painstaking labor much indispensable information would be gathered, but that is certainly a very long and troublesome way.

Fortunately we have in the "Ophthalmic Year Book" means of obtaining this information easier, quicker and in a most complete manner; this publication covering the literature of the whole world.

The helpfulness of this new device for literary work is not generally recognized. As the reading of the Year Book is not easy, and perhaps at times tiresome, because of the concentration of new thought it requires, and the previous knowledge of the subject treated it assumes, the reader ordinarily makes hasty perusals, staying perhaps longer in some familiar subjects. But when after a systematic study of one subject from the larger works, one runs over the Year Book, not for the last year only, but thru many volumes back, the whole matter stands in a better light, and the progressive advance of science is being watched gradually and and recognized thoroly.

Still as we said before, it is always wise to go to the original sources, to the papers or monographs themselves when writing on new subjects. The reviews, and even the abstracts reflect the personality and training of the reviewer, and some times do not give due justice to the merits of the papers. It is for the prospective writers to draw from the original sources a better and clearer understanding of the thoughts of former authors.

It may indeed be assumed that the time has passed, when the experience of one man alone was conclusive in a given subject. But on the other hand,

progress in medicine is dependent not on the quantity of the materials set forth for building, but and especially, of the quality of them. Incomplete, hastily written articles, without references do more harm than good. In reviewing these papers for the digest, striking contrasts are noted between the writings published for the good of the science, and those for complying with medical obligations, or for purely self advertising purposes. Even in those written for the sake of science, unwarranted conclusions are sometimes drawn from poorly or hastily observed facts.

In the direction of "new operations" our literature seems to be a new "Penelope's tapestry," woven and unwoven incessantly. Cutting 3 or 4 mm. farther or placing a stitch in a reverse or "new" way, means the elaboration of a paper with lengthy descriptions and many cuts. There are articles in which a new operation is proposed and discussed, its advantages and drawbacks stated, the author ending by the confession that he has never performed the operation described; but offers his conclusions as mere suggestions for somebody else, with better opportunities to verify their accuracy.

The true motives of these and other papers are so frequently unnoticed, that general or even special journals accept them for publication; the result being an enormous overcrowding of medical literature and a large waste of energy and time.

To say something new and truly original in our branch, it is necessary to go ahead of our predecessors, to the very front in the race for advancement, before we can claim another step forward. Even those who separate themselves from the beaten track and make a new trail, must know where the old trail ends, in order to avoid a false claim, or going into a blind alley.

Teachers in ophthalmology, all over the country, can do much for the progress of our specialty, if they emphasize before their students the importance of ascertaining what others have done on a subject all over the world,

before any attempt is made to set forth supposedly new ideas, new methods and especially new operations.

URIBE TRONCOSO.

HOLE IN THE MACULA.

The series of holes in the macula reported in the November number of this journal is much larger than any series previously reported, at any one time. The cases were all observed in young men, examined for military service and furnish a fair statistical basis for general conclusions. The clinical characteristics of such lesions are now established. The typical cases always involve the fovea centralis, being practically concentric with it; and the appearances of the lesion are well shown in the colored plate.

The size varies somewhat as is illustrated in this series of cases. This we may suppose depends partly on the extent of retina in this region that has the essential foveal structure—the absence of vessels, nerve fibres, most of the retinal layers, and supporting tissue generally. Probably it also depends on the severity of the injury or the disease process that causes the lesion; which would naturally determine the distance to which the atrophy would extend, in the gradually thickening and strengthening retina surrounding the fovea.

In young persons hole in the macula is due to trauma; generally a contusion as by a stone, marble, stick, baseball, flying cork, etc. Such injuries occurring in childhood, and causing no external damage to the eye, are apt not to be very closely investigated. For a time the exact character of the lesion is concealed by intraocular hemorrhage. The patient notices the sight improving a little later, and does not know when the improvement ceases. Finally he accepts unconsciously his loss of central vision; as it causes no impairment of his binocular field, and he has the other eye for accurate seeing at the fixation point. This accounts for the discovery of so many cases previously unsuspected, when

large numbers of recruits came to have each eye tested separately.

Ogilvie who gathered together 15 cases thought this retinal lesion always traumatic, and diagnostic of the kind of injury which produced it. But not all cases of hole in the macula are due to trauma. Coming on later in life, it is more commonly due to retinal disease. The first cases reported in this country, by de Schweinitz, were two of the "senile form." One of these was associated with arteriosclerosis, and such association had been noticed by Haab. Such a case may give great concern from the start, and the gradual loss of visual acuity is pretty certain to bring an adult patient under observation. Hole in the macula is also one of the unusual degenerative lesions that attend high myopia; and Cohen described one caused by rupture of a choroidal abscess.

As to its early course very little is known. Kuhnt had noted it in 1891, but did not describe it fully until 1900. Other descriptions of it appeared in the latter year. But all of these referred to the lesion when it had assumed its permanent form, and might have existed for years. One of de Schweinitz' patients had only noticed failure of central vision for three weeks. But she had suffered from iritis nine months before which left her with vision of 6/9; and the ophthalmoscope showed at the first examination nearly the typical appearance of such a lesion, which underwent very little change afterwards.

Zentmayer saw a traumatic case one week after the eye had been struck with a piece of wood. There was then blood in the anterior chamber and increased intraocular tension. After four weeks the typical hole in the macula had developed, with deep glaucomatous cupping of the disc. Kipp saw an eye the day after injury, and found the characteristic red oval spot in the macula. But the optic nerve had been torn across by the bullet that caused the injury, the retinal vessels were very narrow, and the whole retina was whitish. This eye was enucleated on

the fourth day and studied by Alt. He found the edges of this somewhat ragged hole bent forward toward the vitreous, the cells there staining badly, and pigment epithelium beginning to proliferate and invade the retina. Early studies of the lesions that end in hole in the macula would have especial value.

E. J.

AMERICAN BOARD FOR OPHTHALMIC EXAMINATIONS.

With the ending of world war, and the return of hundreds of American ophthalmologists to civil life, there is a renewed interest in the work of this agency for standardizing and improving the training for ophthalmic practice. And this new interest is being met by a new activity on the part of the Board.

When over half its members were in the service of the United States Government, its activity as a board was necessarily somewhat in abeyance; but it is very much alive and will be a good deal in evidence in the next few months.

Elsewhere we publish the list of those who have been awarded its certificate up to the present time. It is a very creditable list in spite of the difficulties and delays of organization, energies diverted to other channels and the hesitation of older men to give countenance to a new institution. In the next year we expect to see this list doubled from among the more active, well-trained, members of the ophthalmic branch of the medical profession; who desire, both to support a movement that promises so much for the future of American Ophthalmology, and to try out their own training and scientific development and equipment with the idea that these should be pushed and kept up to the best standard attainable.

The organization and personnel of the Board is now as follows:

Representing the American Ophthalmological Society:

Dr. Myles Standish, Chairman.

Dr. John E. Weeks.

Dr. William C. Posey.

Representing the Ophthalmological Section of the American Medical Association:

Dr. Edward Jackson.

Dr. Hiram Woods.

Dr. Walter R. Parker.

Representing the Academy of Ophthalmology and Oto-Laryngology:

Dr. Walter B. Lancaster.

Dr. John R. Newcomb.

Dr. Wm. H. Wilder, Secretary.

The next meeting of the Board will be held at New Orleans, just before the meeting of the American Medical Association the latter part of April. It has been found that there is a tendency to delay making application until a few days before the time set for the meeting of the Board. This necessarily postpones action upon such application until the next meeting; always an interval of several months, for a board the members of which have to come from all parts of the country. A rule of the Board has required the submission of case reports at least sixty days before the meeting at which the application was to be acted upon. This rule has sometimes been relaxed, when during the war the number of applications was small; but the interval is none too long when several hundred case reports are to be sent from one member of that committee to another, and read and passed upon. If intending to join in this wide movement to improve the training for ophthalmic practice, the injunction, "Do it now," is most appropriate.

E. J.

CORRESPONDENCE.

Examining Recruits.

TO THE EDITOR: In his very interesting paper on "Macular Hole" (November issue) Dr. Middleton casts a rather unwarranted aspersion on the work of the ophthalmic members of the examining boards. He is manifestly not familiar with the handicaps under which the work had to be done, viz.: An average of 150 men called at 1 p.m., three days in the week; rendezvous at some public building; and the examina-

tions all made in such rooms therein as could be made to serve. If only 100 men appeared, and 3 minutes were allowed for each it meant 5 hours of nerve racking work. Under such conditions, the best that could be done was the weeding out of the plainly defective, and the passing of the doubtful cases up to the regular army board. I may add, as measurably balancing the account, that I have seen some returned soldiers that I would have rejected in the "3 minutes."

H. B. YOUNG.

Localization of Foreign Bodies.

TO THE EDITOR: In the May 1919 number of the AMERICAN JOURNAL OF OPHTHALMOLOGY I found an article by John J. O'Brien, M. D., entitled "Foreign Bodies in the Eye Ball, Three Illustrative Cases." In case two he removed an eye after having been informed by two reliable roentgenologists that there was a piece of steel inside the globe and discovered afterwards that the steel was in the orbit outside the eye. He presents a plan which he believes would be helpful in avoiding a like tragedy in future cases. It is as follows:

"The Roentgenologist of the Manhattan Eye, Ear and Throat Hospital willingly told me how to avoid a like tragedy in the future. Suppose the exposure for the picture is ten seconds. For the first five, have the patient look straight out, then have him change the direction of the visual axis by rolling the eye up as much as possible and complete the exposure. Make another exposure but do not move the eye. If the foreign body is in the globe, the X-ray will show either two bodies or an extension in the direction of the movement of the opacity as compared with the latter picture. When the foreign body is in the orbit or adjacent tissues its position is not affected by any movement the eye will make. There is, however, a slight possibility of error when the foreign body is in an external ocular muscle or tendon. Then it will show some displacement but a careful reading of the picture will discover the true meaning."

The above stated plan will undoubtedly be of very great use in a great many of the cases in which there is doubt as to whether the foreign body is inside or outside the eye. However, I do not believe that this plan will definitely locate the foreign body in all the doubtful cases. There is not only a slight possibility but a very great possibility of error in the plan which he presented. This is illustrated I believe in a case in which I unfortunately removed an eye unnecessarily, and I wish to report this case because I do not believe that the above method of localization or any other method would have definitely located the foreign body either inside or outside the eye. Altho we did not try this method there is no question in my mind that the body would have moved with the eye ball.

It was a pity that the eye had to be sacrificed when the metal was outside the globe and certainly would not have caused very much trouble. One, of course, regrets that any thing of this sort should happen. However, we can not always be sure that the foreign body is inside or outside the ball and prior to the enucleation my decision to remove the globe appeared to me the proper and wise step.

One authority has stated that "the most common and dangerous failure of roentgen-ray localization of foreign bodies in the eye has been the report that the foreign body was outside the eye ball when it was really within it!" I might change this statement by saying "that it is certainly a sad failure of roentgen-ray localization to find a foreign body inside the eye when in fact it is outside the eye." However, I do not attach any blame to the roentgenologist, who made the localization in the following case and who is a very skilled and reputable man, but to the fact that there was no plan that could have been used to make a true decision as to its location.

The case is as follows: A man 45 years of age, machinist, family and personal history negative, was pounding a tool with a hammer, both of which

were made of hard tool steel, when, a small piece of metal broke loose from one of the tools, striking the left eye. I saw the case ten hours after the injury and found a vertical wound in the cornea 3 m.m. in length just inside the limbus at eight o'clock. The wound was a clean cut incision such as might have been made with an ordinary von Graefe cataract knife. It was easy to trace the steel through the cornea and the iris at the time of examination, but I was unable to make out any of the details of the fundus on account of the haziness of the lens. The wound in the iris was also clean cut and did not gap. There was no hemorrhage to be seen in the anterior chamber and no proptosis of the eye ball. The roentgenologist made a thoro examination and decided that the foreign body was in the eye ball about 6 m.m. to the nasal side of the optic disc and just in front of the retina. The wound in the cornea was healed in two or three days, no apparent inflammation of the iris, and with an opaque lens.

Acting upon the report of the roentgenologist I made an attempt to remove the foreign body through a posterior scleral incision with a magnet but failed to recover the steel. I used a small hand magnet which was very powerful and with a long tip which I was able to introduce into the incision. Deciding it was dangerous not to remove the eye after the trauma of the injury and operation, and because the steel was, as I thought in the globe, I accordingly enucleated it. However, I discovered the steel just outside the eye lying flat against the sclera about 6 mm. to the nasal side of the optic nerve. It was a piece of hard tool steel about one half m.m. in thickness, 3 mm. in length and 2 mm. in width. It was bright and untarnished as a new knife blade and the edges were very nearly as sharp. The general direction of the steel had been on a line thru the puncture and counterpuncture toward the ostium of the sphenoid sinus. After making the counterpuncture the piece of steel had turned almost at right angles, hugging the sclera and

traveled to the spot where I found it. The counterpuncture was a clean incised wound through the three coats. This wound had started to repair at the time the ball was enucleated and it took quite a little force to reopen it.

CHARLES J. ADAMS.

Kokomo, Ind.

CERTIFICATES IN OPHTHALMOLOGY

Up to the close of the year 1919 the American Board for Ophthalmic Examinations has conferred its certificate upon the following applicants:

Adams, Charles F.....Trenton, N. J.
Allport, Frank.....Chicago, Ill.
Andrews, Joseph A.....Santa Barbara Cal.
Barnes, J. Steele.....Milwaukee, Wis.
Beach, Sylvester J.....Augusta, Maine
Bedell, Arthur J.....Albany, New York
Bell, Mace Hudson.....Vicksburg Miss.
Benedict, Wm. L.....Rochester, Minn.
Bennett, Arthur G.....Buffalo, New York
Black, Melville.....Denver, Colorado
Black, Nelson M.....Milwaukee, Wis.
Blair, William W.....Pittsburgh, Pa.
Blue, J. B.....Memphis, Tenn.
Briggs, H. H.....Asheville, N. C.
Brown, Samuel H.....Philadelphia, Pa.
Bruner, W. E.....Cleveland, Ohio
Bulson, A. E., Jr.....Fort Wayne, Ind.
Butler, W. K.....Washington, D. C.
Buvinger, Chas. W.....East Orange, N. J.
Cadwell, C. T.....Poughkeepsie, N. Y.
Calhoun, F. P.....Atlanta, Ga.
Carson, W. E.....Pittsburgh, Pa.
Cayce, Eldred B.....Nashville, Tenn.
Charles, Jos. W.....St. Louis, Mo.
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Clark, Fred. T.....Westfield, Mass.
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Darling, Chas. G.....Chicago, Ill.
Dennis, D. N.....Erie, Pa.
Dennis, Edward P.....Erie, Pa.
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 Wood, Casey A.....Chicago, Ill.
 Woodruff, Thos. A.....New London, Conn.
 Yazujian, D. M.....Trenton, N. J.
 Zentmayer, Wm.....Philadelphia, Pa.

*Deceased.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon. Volunteers are needed in other localities.

DEATHS.

Dr. J. L. Goux, Detroit, Michigan, died December 1st, aged 48.

Dr. R. L. Randolph, Baltimore, Maryland, died December 9th, aged 59.

Dr. Edgar R. Russell, Asheville, N. C., died November 27th, aged 49.

Dr. George H. Stubbs, Birmingham, Alabama, died November 28th, aged 50.

PERSONALS.

Dr. Vard H. Hulen, of San Francisco, has been visiting in Houston, Texas, for several weeks.

Dr. Mark J. Schoenberg has been appointed adjunct consulting ophthalmologist to the Presbyterian Hospital, New York City.

Beatson Hird and T. Harrison Butler have been elected surgeons to the Birmingham and Midland Hospital.

Dr. Gustavus I. Hogue has been appointed head of the Eye, Ear, Nose and Throat Department of the new Milwaukee County Dispensary.

Dr. George E. de Schweinitz, Professor of Ophthalmology at the University of Pennsylvania, has been making a brief holiday stay in Florida.

Dr. G. Oram Ring of Philadelphia, President of the Philadelphia Medical Club, has been enjoying a holiday fishing jaunt at Port Sewell, Florida.

Dr. Howard Forde Hansell of Philadelphia, Professor of Ophthalmology in the Jefferson Medical College, will spend the brief holiday season at Detroit.

Dr. R. J. Sprowl, lately of Base Hospital Number 34, Nantes, France, A. E. F., has

returned to this country and is now associated with Dr. George F. Keiper of LaFayette, Indiana.

Dr. Wm. M. Sweet, Associate Professor of Ophthalmology at Jefferson Medical College, Philadelphia, is spending his Christmas holidays at the Homestead Hotel, Hot Springs, Virginia.

Dr. H. B. Young, of Burlington, Iowa, celebrated the fortieth anniversary of his arrival in Burlington by entertaining his professional colleagues and neighbors, Friday, December 26th, 1919.

Past Assistant Russell W. Raynor, U. S., P. H. S., is making a survey in the trachomatous districts in the State of Missouri. The Trachoma Hospital at Pikeville, Kentucky is in charge of a Surgeon J. Allen Eldridge, during Surgeon Raynor's absence.

Dr. L. Webster Fox of Philadelphia, had as his guests at the University Club, November 22nd, the members of the L. Webster Fox Ophthalmological Club, who saw service overseas. Several of the guests won high honors abroad. Dr. John A. White was one of the first American surgeons to be made a prisoner.

At the November meeting of the Ophthalmic Section of the College of Physicians of Philadelphia, Col. Mosher, of Boston, delivered an address upon "Nasal Drainage in Lacrimal Disease," describing his modification of the West operation. Following the Section meeting a reception and supper in honor of Col. Mosher was given by Dr. George E. de Schweinitz.

SOCIETIES.

The Thirtieth Anniversary of the foundation of the Paris Ophthalmological Society was commemorated on November 16th.

The Utah Ophthalmological Society held its second meeting of the season on November 17th at the residence of Dr. G. B. Pfoutz in Salt Lake City.

At the December meeting of the Chicago Ophthalmological Society some of the more recent developments of Glaucoma were discussed. Twenty-two members met at the informal dinner preceding the meeting, and more than sixty were present.

Plans are under way for a joint meeting, in February, of the Minnesota Academy of Ophthalmology and Oto-Laryngology, the Milwaukee Oto-Ophthalmological Club, the Indiana Academy of Ophthalmology and Oto-Laryngology, the Chicago Oto-Laryngological Society, and the Chicago Ophthalmological Society. The day will be devoted to clinics, and the meeting will be held in the evening.

On this date the Pittsburgh Ophthalmological Society held its initial meeting since the opening of the recent war.

The following officers were elected to serve for the current year:

President, Edward B. Heckel.

Vice-President and Treasurer, Edward Stieren.

Secretary, Adolph Krebs.

Reporter, Hunter H. Turner.

MISCELLANEOUS.

Among a population of 16,000,000 in Mexico, there are 120,000 blind.

Dr. W. G. E. Flanders, of Burlington, Vt., has patented an arrangement of a disk of lenses, like the Rekoss disk, to be used at

the sight-hole of an ear, nose, or throat mirror.

It is learned, through the Illinois Society for the Prevention of Blindness, that sixteen deaths from wood alcohol have occurred in the past three months. Four other victims are in a precarious condition, and if they recover it is probable there will be some permanent impairment of their vision.

Professor F. de Lapersonne, assisted by Professor Terrien, Dr. Velter, Dr. Prelat and Dr. Monbrun, directors of the clinic and laboratory of the Faculty of Medicine of Paris, have begun a graduate course of sixteen lessons in ophthalmology at the Hotel Dieu. Foreign medical men may attend.

Dr. F. Park Lewis, of Buffalo, has been elected a member of the Board of Directors of the National Committee for the Prevention of Blindness. This committee is doing a most excellent work in arousing interest in methods for the prevention of blindness, and in our public schools by the formation of special classes for the visually defective.

At the last session of the Minnesota legislature a bill was passed providing for the establishment of classes for the conservation of vision, by appropriating a sum of \$200.00 per annum for each child requiring the special benefit of such classes. Dr. Meyer, of Ohio, has been appointed supervisor of the department, and Dr. Douglas F. Wood Minneapolis, has donated his services for the examination of candidates and treatment of children accepted for conservation of vision classes.—A. M. A. Journal.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

DIAGNOSIS.

- Dolman, P.** Tests for Determining the Sighting Eye. *Amer. Jour. Ophth.*, v. 2, p. 867.
- Scheffer.** Sight and Photography through Cloudy Media. *Naturwissenschaften*, 6, p. 768.

THERAPEUTICS.

- Bonnefon, G.** Therapeutics in External Eye Diseases. *Ann. d'Ocul.*, v. 156, pp. 577-597.
- Darier, A.** Parenteral Injections of Cow's Milk. *Clin. Opht.*, v. 23, p. 131. *Abst.*, *Brit. Jour. Ophth.*, v. 3, p. 567.
- Hori, S.** Pyoktanin in Ophthalmology. *Japan Med. World*, Nov. 2, 1919, No. 307. *Abst.*, *Jour. Amer. Med. Assn.*, Dec. 13, 1919, v. 73, p. 1856.
- Iredell, C. E., and Ryley, C. M.** Diathermy in Ocular Diseases. *Proc. Roy. Soc. Med.*, 1918-19. Sec. on Electro-Therap., 31-33.
- Repeated Titles.** **Chevalier** (v. 2, p. 626), *Brit. Jour. Ophth.*, v. 3, p. 569. **Gaupillat** (v. 2, p. 371), *Brit. Jour. Ophth.*, v. 3, p. 566.

OPERATIONS.

- Frias Onate, A.** Cocain in Ophthalmology and Oto-Laryngology. *Rev. Cubana de Oftalm.*, v. 1, p. 613.

REFRACTION.

- Bailey, J. H.** Inverse Astigmatism and Asthenopia. *Amer. Jour. Ophth.*, v. 2, p. 892.
- Chacon, A.** Astigmatism of the Oblique Rays and Refraction. (1 ill.) *An. Soc. Oft. Mexicana*, Nov., 1919, p. 207. *Rev. Cubana Oftalm.*, v. 1, pp. 548-552.
- Davis, A. E.** Accommodation in the Lensless Eye. *Amer. Jour. Ophth.*, v. 2, p. and p. 881.
- Dunn, P.** Notation of Axes of Cylinders. *Brit. Jour. Ophth.*, v. 3, p. 575.
- Gerard, M. G.** Acute Poisoning from Two Drops of Duboisin. *Ann. d'Ocul.*, v. 156, p. 637.
- Gould, G. M.** Personal, Artistic and Public Tragedies of an Artist's Eyestrain. *American Medicine*, Nov., 1919, p. 725.
- Katz, J.** Relation of Eye and Ear Disturbances to Disorders of Gastroenteric Tract. *Med. Rec.*, 96, p. 727.

- Koegel, H.** Pupillary Distance and Other Dimensions. *Zeitschr. f. ophth. Optik*, 1916, pp. 33-65, and 129.
- Lang, T. B.** Standard Notation of Cylinder Axes. *Brit. Jour. Ophth.*, v. 3, p. 576.
- Mendoza, R.** Theory of Skiametry. *Rev. Cubana de Oftalm.*, v. 1, p. 598.
- Veasey, C. A.** Paralysis of Accommodation Due to Focal Infections. *Amer. Jour. Ophth.*, v. 2, p. 858.

OCULAR MOVEMENTS.

- Bourland.** Total Paralysis of Third Pair in Right Eye. *Ann. d'Ocul.*, v. 156, pp. 616-620.
- Carreras, B.** Mnemonics for Addition or Subtraction of the Angle Alpha in Strabismus. *Arch. de Oftal. Hisp.-Amer.*, v. 19, pp. 622-627.
- Howard, H. J.** A Six Meter Stereoscope. (2 ill.) *Amer. Jour. Opht.*, v. 2, p. 849.
- Lafon, C.** Nystagmus and Nodding Spasm. *Jour. de Méd. de Bordeaux*, v. 90, p. 404. *Abst.*, *Jour. Amer. Med. Assn.*, v. 73, p. 1729.
- Lapersonne, F. de and Prélat.** Extrinsic Ophthalmoplegia in Basedow's Disease. *Soc. d'Opht. de Paris*, Oct. 11, 1919. *Ann. d'Ocul.*, v. 156, p. 620.
- Leventhal, J. H.** Homonymous Diplopia. *Optic Jour. and Rev. of Optom.*, v. 44, p. 163.
- Liddell, H. S.** Eye Movements and Attention. *Amer. Jour. Psychol.*, v. 30, p. 241.
- Lidwell, M. C.** Ocular Vertigo. *Med. Jour. Australia*, October 18, 1919, p. 328.
- Pelfort, C.** Weber's Syndrome in Boy Aged 4. *Revista Med. del Uruguay*, v. 22, p. 163. *Abst.*, *Jour. Amer. Med. Assn.*, v. 73, p. 1734.
- Prince, A. L.** Compensation of Ocular and Equilibrium Disturbances which Follow Removal of the Labyrinth. *Amer. Jour. Phys.*, v. 49, p. 130.
- Ruiz, J. M.** Operation for Advancement of External Rectus Muscle. (3 ill.) *Rev. Cubana de Oftalm.*, v. 1, pp. 573-578.
- Woods, H.** Interpretation of Muscular Imbalance. *Jour. Amer. Med. Assn.*, v. 73, p. 1784.

CONJUNCTIVA.

- Buley, E. C.** Xerophthalmia Among Rats. *Biochemical Jour.*, July, 1919. *Abst.*, *Med. Jour. Australia*, Oct. 11, 1919, p. 315.

- Cirincione, G. Trachoma in the Army. Gazz. Med. lomb. Milan, 78, pp. 9-11.
- Finlay, C. E. Varieties of Trachoma and Modes of Treatment. Revista Cubana de Oftal., v. 1, p. 619.
- Guiral, R. Blennorrhagic Ophthalmia Neonatorum. Los Progress de la Clin., Sept., 1919, p. 121.
- Santos Fernandez, J. Stubborn Conjunctivitis. Rev. Cubana de Oftal., v. 1, p. 533.
- Scolari, E. Prophylaxis of Trachoma. Gazz. de Osp. Milan, v. 40, p. 59.
- Wieden, E. Treatment of Trachoma. Rev. Cubana de Oftalm., v. 1, pp. 578-584.
- Repeated Titles. Sculco (v. 2, p. 372), Brit. Jour. Ophth., v. 3, p. 564.

CORNEA AND SCLERA.

- Fernandez, F. M. Herpes of Cornea after Antityphoid Vaccination. Rev. Cubana de Oftalm., v. 1, p. 592.
- Guiral, R. Treatment of Keratomalacia. Rev. Cubana de Oftalm., v. 1, p. 610.
- Hiwatari, K. Histology of Cornea-Scleral Margin. Acta Scholae Med. Univ. Imp. in Kioto, v. 3, 1919, pp. 277-286.
- Key, B. W. Antidiphtheritic Serum with Special Reference to Hypopyon Keratitis (Bibl.) Arch. of Ophth., v. 48, pp. 581-613.
- Lottrup-Andersen. Parenchymatous Keratitis with Cross-barred Marking. Hosp. Tid., v. 62, p. 569.
- Löwenstein. Operation for Staphyloma of Cornea. Deutsch. med. Woch., v. 45, p. 480.
- Menacho, M. Primary Circumscribed Abscess of Sclerotic. (4 ill.) Arch. de Oftal. Hisp. Amer., v. 19, pp. 605-616.
- Potts, G. Keratitis Following Explosion of Powder. Roy. Soc. Med. Sec. on Ophth., Dec. 3rd, 1919; Lancet, Dec. 13, 1919, p. 1084.
- Small, C. P. Acriflavin as a Stain for Corneal Ulcers. Amer. Jour. Ophth., v. 2, p. 892.
- Wise, W. D. Fragilitas Ossium with Blue Sclerotics. Jour. Amer. Med. Assn., v. 73, p. 1696.

ANTERIOR CHAMBER AND PUPIL.

- Stevenson, E. Mobile Cyst of Iris. Brit. Jour. Ophth., v. 3, p. 555.

UVEAL TRACT.

- Cohn, P. Hetol in Chorio-Retinitis Tuberculosa. Münch. med. Woch., v. 65, p. 1438.
- Dianoux. Aspirin in Syphilitic Iritis. Clin. Opt., v. 23, p. 147. Brit. Jour. Ophth., v. 3, p. 567.
- Mas Soewarno. Forms of Iris Depigmentation. Amer. Jour. Ophth., v. 2, p. 884.
- Thomsen, H. Uveo-Parotidea Treated with Tuberculin. Ugeskrift for Laeger, v. 81, p. 1517.

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- Santos Fernandez, J. Exaggerated Fear of Sympathetic Ophthalmia. Gaceta Med. de Mexico, September, 1919, p. 204.
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- Santos Fernandez, J. Iridectomy the Ideal Treatment in Glaucoma. Rev. Cubana de Oftal., v. 1, p. 503.

CRYSTALLINE LENS.

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- Bennett, A. G. Immediate Capsulotomy in Extraction of Cataract. Amer. Jour. Ophth., v. 2, p. 854.
- Lane, F. Persistent Posterior Fibrovascular Sheath of Lens. (15 ill., Bibl.) Arch. of Ophth., v. 48, pp. 573-580.
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- Arey, L. B. Retinal Mechanism of Efficient Vision. Jour. Comp. Neurol., v. 30, p. 343.
- Bell, L. Visibility of Bright Lines. Science, October 3, 1919, p. 331.
- Birch-Hirschfeld. Origin and Treatment of Retinal Detachment. Med. Klin., v. 15, p. 200.
- Doesschate, G. ten. Position of the Yellow Spot in Relation to the Optic Nerve. Nederl. Tijdschr. v. Geneesk., v. 2, September 27, 1919, p. 906. Abst., Jour. Amer. Med. Assn., v. 73, p. 1968.
- Gonzalez, J. Hemorrhages of the Retina in Influenza. Med. Ibera, October 11, 1919, v. 9, p. 19. Abst., Jour. Amer. Med. Assn., v. 73, p. 1908.
- Potts, G. Detachment of Retina and Unusual Condition of Conjunctiva. Roy. Soc. Med., Sec. on Ophth., Dec. 3rd, 1919. Lancet, Dec. 13, 1919, p. 1084.

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COLOR VISION.

Oloff, H. Color Blindness in New Born. *Med. Klin.*, v. 15, p. 233.

EYEBALL.

Cassimatis. Ocular Colobomas. *Clin. Opht.*, v. 23, p. 151.

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- Harry, P. A.** Acute Anterior Ethmoiditis in Young Subjects. Brit. Jour. Ophth., v. 3, p. 557.
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SUGGESTIONS ON METHODOICAL EXAMINATION OF THE PUPILS.

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The importance of observing the pupil under definite conditions in its routine examination is here pointed out; and a method for making such exact observations is described. The results obtained in clinical cases by this method are reported, with graphs which call attention to the value of the method and the practical utility of such records of the pupil.

Any improvement of our methods of examination may be of value. The more precise our procedure, the more trustworthy will be the results therewith obtained, the greater, also, the clinical value of what may be inferred from them. The publication of the present paper may therefore be justified; it describes the procedure followed for some recent clinical researches on pupillary troubles, a subject perhaps often too hastily dealt with in current practice.

The first important factor to be pointed out is "light." It has been said, by an author of great authority, that "the photomotor reflex should be observed opposite a well-lit window, and a dilator reflex in a dark room. On certain days when the intensity of the light changes suddenly, owing to the passing of large black clouds, exploration of the pupil should be avoided. Moreover the examination should not be made in twilight, as then the progressive dilatation of the pupils would certainly falsify the results."

This is certainly too vague a method. It is well known that the human eye, whose sensitiveness is so great when comparing two adjacent shades of luminosity, is, on the other hand, a very inaccurate photometer.

This is due to the adaptability of the retina. The works of Hering are very instructive on this subject. It will be remembered that, among other points, he was able to

demonstrate that at noon on a certain clear day, the black letters of a printed paper reflected three times more light than was reflected by the white part of the same paper at six o'clock in the morning. It is certain that the human eye would never have estimated the difference so high.

From this we must deduce that it is difficult to judge with absolute certainty whether the pupils are of normal diameter, or whether they are pathologically dilated or contracted; further, if the photomotor reflex is examined, great experience is required to judge whether it acts with normal vivacity and amplitude. This is why oculists consider that an examination of the reflex ought to be conducted in the dark room. We would insist on this detail; that the conditions under which the examination is made should be absolutely constant, as that is indispensable for the purpose of comparing different observations.

Obviously it would be desirable to examine the same pupils with various—but always known—intensities of illumination.

The second point of this paper refers to the size or the diameter of the pupil. It is perhaps not essential to know this exactly, which is doubtless the reason that has hindered pupillometry from becoming general and its instruments from being perfected. But for thoro study, especially if it is desired to compare not two cases

merely, but also the condition of the pupils of the same individual at different periods—that is, if one wishes to keep a patient under close observation—it is essential to be able to note down the results in figures.

Obviously it would be desirable to make the measurements as exact as possible. In practice, for the requirements of ordinary clinical observation, and considering the great variation in normal pupillary diameters, it seems allowable to have recourse to very simple methods. When notes are made by the same observer, they will always permit of comparison; between one observer and another the differences will only consist in the order of the size of the physiologic variations.

Simply to form estimates would not suffice, altho the same author quoted above, considers that “with a little practice it is possible to estimate the exact diameter of a pupil to within a half millimeter.” He adds, and here he may be right, that one can estimate the relative diameters of the two pupils to within a quarter millimeter. This opinion apparently justifies the use of scales consisting of black circles of progressive diameters, which when placed beside the eye under examination, supply the number sought for by means of a simple comparison. The scale should be finely enough graduated, at least three circles are needed to each millimeter.

Personally, having recently had occasion to make extensive investigations, we made use of a flat sliding scale, which was placed as near as possible to the cornea, endeavoring to hold it always at the same distance away. The figures indicated by the sliding rule, graduated in tenths of a millimeter, though perhaps not accurate, were yet so within limits compatible with the requirements of a clinical examination; and doubtless the results of the same observer were comparable with one another.

Finally, to render the figures obtained by pupillometry yet more practically useful, our third suggestion is to put them down into the form of graphs.

METHOD OF EXAMINATION.

Here is the description of the method followed in taking the observations hereafter published. Against the wall of a dark room was placed a seat, provided at the back with a head-rest intended to fix each patient's head at a uniform height. The patient looked steadily at an object placed on the opposite wall at such an elevation that the line of sight made an angle of 10° with the horizontal; this obliquity was sufficient to prevent the head of the observer, seated a little lower in front of the patient from covering the object to be looked at.

At a distance of 25 cm. in front of the patient's forehead, was placed a black vertical disc, 25 cm. in diameter. Immediately behind this diaphragm, at the elevation of its center, was suspended a frosted lamp of 32 candle-power, but there was nevertheless sufficient diffused light in the dark room to permit of observation of the pupils.

A second intensity of illumination was obtained by sliding away the disc. The lamp was then exposed.

Again the lamp itself could be brought nearer the patient until it was no more than 15 cm. away, instead of the previous 30; at the same time it was lowered somewhat, so that it remained in the straight line between the eyes and its first position. This line made an angle of 20° with the horizontal.

In each of these three illuminations (A. B. C.), we could obtain for each eye three different measurements (1, 2, 3), according to whether the other eye was covered, or both eyes were open, or whether the eyes were in convergence at 20 cm. In practice the process was soon curtailed, the third reading, and very often the first, for minimum light being ignored, the three measurements for medium light were preserved, and as to the intense light, the pupils were only measured when both eyes were open and parallel.

In the graphs the initial diameter was marked on the ordinates. The inscription on the same vertical of other successive diameters would not have been sufficiently clear, so they were

marked to the right at regular intervals, arbitrarily chosen. The confusion that would have resulted from noting all the figures on the original vertical would have been particularly serious when two eyes were being compared.

Besides the physiologic reactions, the methodical examination of the pupils whose action is disordered is often completed by an investigation into their reaction to different collyria. The variations in diameter thus obtained can be added to the graphs, and the in-

that the larger pupil was sometimes the right and sometimes the left one. He suspected a bilateral lesion, and published his observation (which was in other respects very interesting) describing the "mydriase à bascule" of his patient as due to disturbance of both sympathetic nerves.

Summoned to attend this case, we expressed the hypothesis that the variation was in the diameter of the right pupil only, which was alternately dilating and contracting. The doctor in

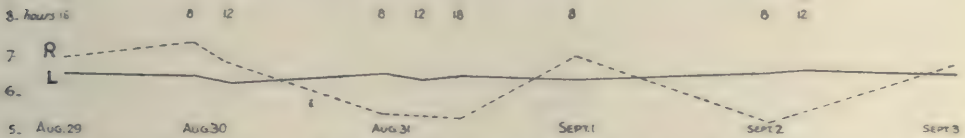


Fig. 1.—Alternating excitation and paresis of the right cervical sympathetic after trauma of the medulla.

tervals of time that have elapsed between each observation should be marked on the abscissas. Each point may be made the basis of a new series of measurements, and thus would be secured a curve visibly demonstrating not only the progressive effect of the collyrium upon the initial diameter of the pupil, but also its effect on the responsiveness of the iris to physiologic stimulus.

ILLUSTRATIVE CASES.

The first case intended to show the advantages of this method, concerns a very simple instance. A soldier, as the result of a fall, was suffering from paralysis of all four limbs, thru the backward dislocation of the 4th cervical vertebra. The power of movement returned after four or five months, beginning in the right lower limb, then in the left arm, and later in the right arm and left leg. Ten months later, only slight paresis persisted in the right limbs with hyperesthesia in the region of the 4th cervical root, and some disturbance of the cervical sympathetic, particularly manifested in the pupils. The doctor who had the case under daily observation in the hospital was struck with the fact that the pupillary inequality frequently varied, so

charge remained convinced because, said he, the patient had been examined by him at precisely the same hour at the same window. As the luminosity of the sky may vary considerably without the observer being aware of it, the

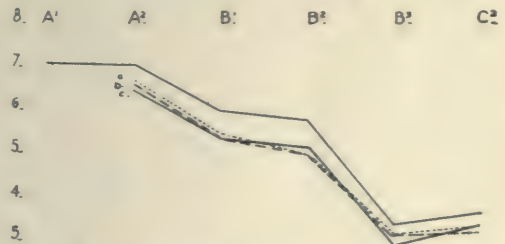


Fig. 2. Normal curves. a, b, c, the same case measured on different days. d another case.

patient was then examined methodically several times a day on several days in succession, and the figures obtained on each occasion were noted. The graph made it clear that one of the two pupils was as good as constant, while the other alternated between states of excitation and paresis. (Curve, Fig. 1.)

In the curve, Fig. 2, which relates to two normal men, the starting figure A¹ indicates the pupillary diameter in minimum light, the other eye being covered. The following values corre-

spond respectively to the diameters given:

- A². Minimum light, both eyes open.
- B¹. Medium light, one eye covered.
- B². Medium light, both eyes open.
- B³. Medium light, both eyes open, converging at 20 cm.
- C². Intense light, both eyes open, and parallel.

Curve, Fig. 3, belongs to a case of

graphic method may sometimes be practically indispensable, as much for the comparison of results, as for arranging the great number of data obtained. It concerns some examinations of wounded soldiers that had been trephined and afterwards showed anisocoria. (Ann. de Méd. Nov.-Dec. 1918.) The question was to find out the nature of this symptom.

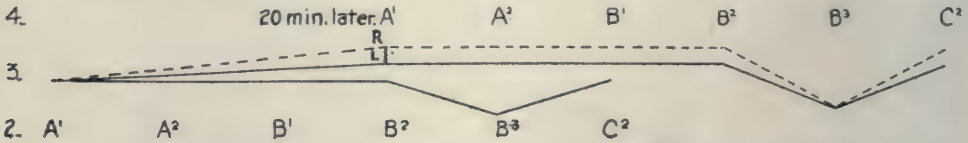


Fig. 3.—A case of tabes (miosis and Argyll-Robertson's symptom) before and after instillation of cocain.

tabes. The two pupils are even, and in a state of marked miosis; they have no reaction whatever to variations of light; stimulus to convergence alone provokes a slight contraction. Further to the right has been noted the effect of cocain on this patient: both pupils

It was first endeavored to discover which of the two pupils was pathologic: that is to say, whether the anisocoria was due to mydriasis or miosis, and then, whether the pupillary disorder was of a paralytic or a spasmodic nature.

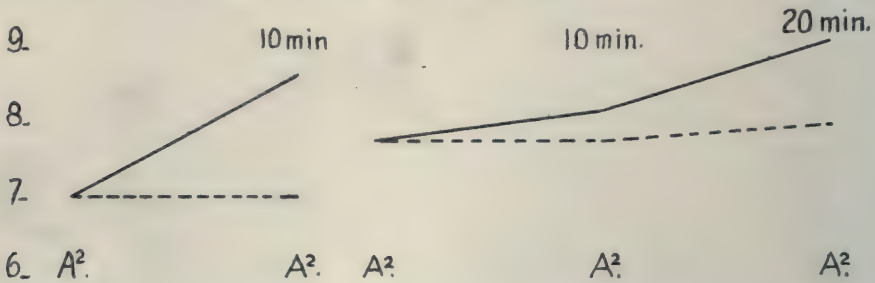


Fig. 4. Two cases of traumatic lesion of the cervical sympathetic without anisocoria. The difference of excitability is rendered manifest by cocain.

slightly dilated, tho unequally; the responsiveness has not varied.

Fig. 4 reproduces the graphs of two cases of very slight lesion of the cervical sympathetic, by wounds in war. Paresis was so little marked that there was no anisocoria. Instillation of 1% cocain showed a great difference in excitability between the two pupillary dilators, the one reacting normally, the other, on the contrary only contracting slightly and after some delay. Here we have only noted the position A² every ten minutes.

An example of more extended clinical investigation will show how the

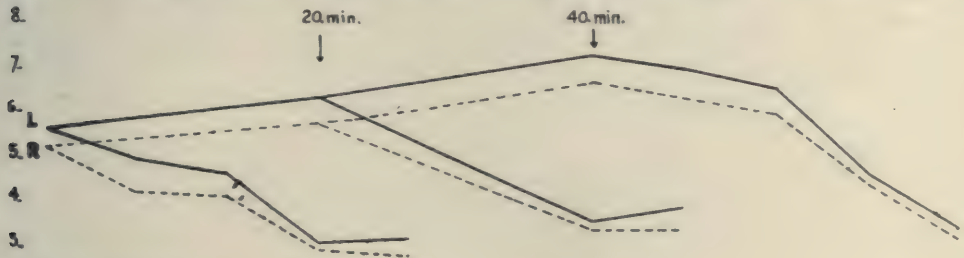
Retaining the theory of the two antagonistic muscles of the iris—the sphincter innervated by the oculomotorius, and the dilatator controlled by the sympathetic—it would have been interesting from the standpoint of cerebral physiology, to discover a connection between the seat of the cranial lesion, meningitic or encephalic, and the motor centers of the pupil. This was especially so because certain neurologists have thought they could detect a particular frequency of unilateral mydriasis in traumata of the frontal region, and on the same side as the wound. Now Lewandowsky states

that the sympathetic may be stimulated by the faradization of certain points of the frontal lobe.

All preconceived notions being put aside, twenty-nine trephined subjects, who showed anisocoria, were methodically examined. The conviction arose that: 1. This symptom is just as fre-

It was therefore necessary to have recourse to collyrium tests. Cocain, by stimulating the sympathetic, caused an absolutely parallel dilatation of both pupils, even in the cases of pronounced miosis. There was clearly no paresis of the sympathetic.

The instillation of homatropin

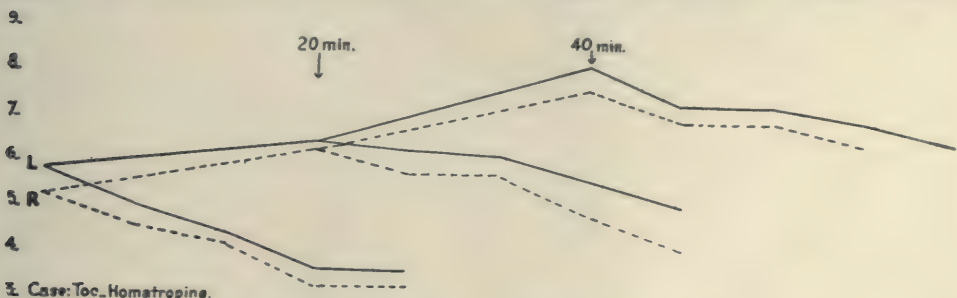


2. Case: Coc. Cocaine

Fig. 5. Diameter of pupil, under influence of cocaine, in man trephined for cranial wound of right parietal region. Vision = 10/10 in each eye. Fundus normal. Pupils larger than average.

quent when any other part of the skull has been injured as it is in cases of frontal wounds. 2. The anisocoria may disappear temporarily in some cases. 3. Measurements of the pupillary diameters showed that both pupils might vary in dimension from day to

caused mydriasis on both sides; but this time there was some difference: with all the patients the larger pupil of the two seemed more strongly influenced than the other. The fact was somewhat disturbing, for in the case of pupils below the average size it



3. Case: Coc. Homatropine.

Fig. 6. In same patient as Fig. 5 under the influence of homatropin.

day to a much larger degree than was the case with the normal pupil (compare the first measures in Fig. 5-6 and 7-8, with A² in Fig. 2).

The comparison of a large number of graphs representing pupillary variations in different lights, established the fact that never, even in the largest pupils, notably exceeding the normal average, was there any parietic disorder of the sphincter. Contraction took place very rapidly and amply, as is shown by B³ in Figs. 7-8.

might signify that the smaller of the two was in a state of spasmodic miosis, whilst in the case of patients with pupils above the average size it led to the conclusion that we had to deal with spasmodic mydriasis.

This apparent contradiction could only be explained by ignoring all motor disturbance in the iris, and considering solely the more or less repleted state of the blood vessels.

The congestion of the iris, added to the tonus of the sphincter gave an ap-

pearance of spasmodic miosis; while relative anemia on the contrary assisted the action of the dilator, and produced the apparent mydriasis. In short, we had to deal not with disorders of the innervation of the motor apparatus of the pupil, but with vasomotor trouble.

numerous cases of cranial wounds, such as vertigo, dizziness, visual disorders, etc. Fig. 5-6 and 7-8 give two examples of anisocoria, the one from a man with narrow pupils, the other from a man with wide pupils. The diameters noted are A^2 , B^1 , B^2 , B^3 , C^2 . It should be remarked that the action

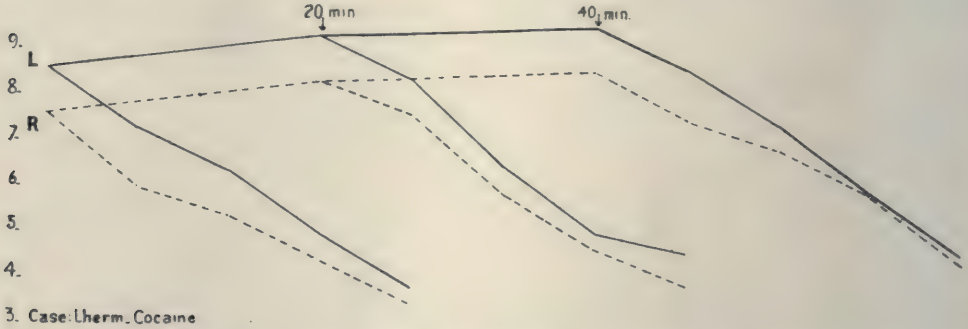


Fig. 7. Diameters of pupils above average under influence of cocaine. V. = 10/10 in each eye. Fundus normal.

This conclusion was interesting, for it threw light on another fact that had emerged at the beginning of our measurements: in men with mydriasis, the larger pupil was generally found on the same side as the fractured bone; but

of homatropin on the irides of the soldier Lherm. (Fig. 8) was so intense, that the larger pupil rapidly reached its maximum of 9.5 mm., at which point it remained. This man having only been measured twenty minutes

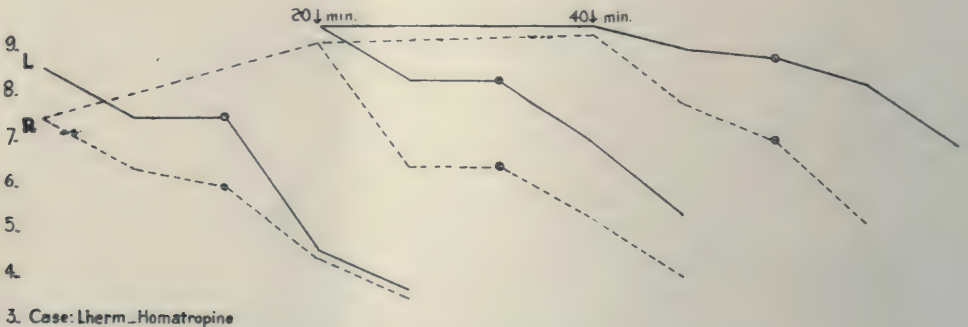


Fig. 8. Same patient as Fig. 7 under influence of homatropin.

in those who were showing miosis, it was the smaller of the two pupils which was generally found on the wounded side. There was therefore vasomotor trouble, constriction or dilatation, possibly bilateral, but predominating on the side of the traumatized hemisphere.

The conclusion also facilitated a better comprehension of a group of other subjective symptoms presented by

after instillation, it was not possible to note upon the abscissas the exact moment when the maximum diameter was reached, which prevented from tracing the first part of the curve. This, however, does not matter, because instead of points A^2 , points B^2 or C^2 may be joined to obtain the profile of the curve.

A detail almost constantly observed may be pointed out: If we compare

curves 5 and 6 relating to a man with narrow pupils, with the curve of Fig. 2, we see that altho contrasts are less marked than normally because the lower limit is the same when the starting point is lower, yet the curves approximate to the normal type, B^3 being in particular smaller than C^2 . In curves 7 and 8, which relate to a man whose pupillary diameters are above the average, inversion of the value B^3 and C^2 is shown from the outset;

this may be a sign of spasmodic mydriasis.

SUMMARY.

To sum up, this paper was intended to draw attention to the clinical importance of a method systematically followed, and to the practical utility of noting the results in the form of curves; many interesting and new results may perhaps be expected from a wide application of the procedure here suggested.

HYPOTONY AFTER TREPHINING.

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This paper reports in abstract four cases in which hypotony followed trephining for glaucoma, persisting for a more or less prolonged period; and discusses the significance of this symptom. It was read before the Colorado Congress of Ophthalmology and Oto-Laryngology, August 4th, 1919.

Trephining, as well as other forms of sclerectomy, have the great shortcoming that the amount of ultimate filtration is not within our control; in other words, the amount of filtration cannot be gauged beforehand. In some cases a permanent fistula is not established, and recourse is then had to another operation. On the other hand, the effect may be too great, the filtration is too free and hypotony results. This result is not frequent; yet exaggerated filtration must lead to changes in the intraocular circulation. These changes are not well understood, and it is not clear whether an eye will bear prolonged reduced intraocular tension. The following observations are submitted as a contribution to this phase of the glaucoma problem.

CASE I. H. B., aged 60; left chronic glaucoma in January, 1913. Sight, L. 6/200+3+1c. $75^\circ=20/200$; T 32. After trephining choroidal detachment; November, 1913 T 10; October, 1914 T 10; February, 1919 T 10; S.=20/200. Field unchanged.

A tension of 10 for six years without bad effect on vision or media.

CASE II. F. S., aged 56; chronic glaucoma right and left. Sight, R 3/200, L 6/200. T. 60 each. Trephining, February, 1913; choroidal detach-

ment O. D.; November, 1913 T 4-5; December, 1914, R. 2/200; T 2, L. 6/200 T 4; October, 1915, R.H.M. T 2; L 5/200 T 5; September, 1916, R. L. P. Opac. lentis; L. 3/200; April, 1918, Right cataract P. L., L 3/200, T 8; August, 1918, R. iridocyclitis; November, 1918, L. 1/200 cataract developing; July 1st, 1919, R. cataract accreta, phthisis bulbi; L. Cataract mature, field normal.

During six years tonometric reading of 2 in one eye and 6 in the other. The former slowly developed iridocyclitis, cataract accreta and phthisis bulbi. The other eye now has a cataract with good light perception and ocular tension of 6.

CASE III. S. Y., aged 58; Chronic glaucoma, R. and L. Sight, 20/40 in each eye. April, 1913, trephining. January, 1914, T. R. 5, L. 8; January, 1915, T. R. 4, L. 8; April, 1916, R. 20/40, L. 20/30; R. 6, L. 7; January, 1919, R. 20/50, L. 20/40, T. 6 each.

After five years tension of 6 in both eyes without any deterioration of vision or change in the eyes.

CASE IV. C. T., aged 73; left chronic glaucoma, R. absol. glaucoma; Sight L.—4—1.5 c. V. 20/40; T. 31-36. Trephining left, June 16, 1915, followed by detachment of choroid which persisted

until September 15th, 1915. October, 1915, 20/70; T. 8. February, 1916 beginning opacity (posterior cortical) in lens. April, 1916, T. 8; February, 1917, 10/200; July, 1917, 4/200; April 10, 1919 St. id.

The choroidal detachment after operation persisted for three months, a tension reduced to 8 for four years, with gradual development of cataract.

The operation performed in these cases was the usual one following the directions laid down by Elliot. A two mm. trephine was used in the first three, and a $1\frac{1}{2}$ mm. in the fourth. A large ectatic scar resulted in all. A choroidal detachment was observed in the course of three of the cases. The ocular tension measured in these six eyes at a period varying from four to six years after operation; 2, 5, 10, 4, 8 and 8. In 3 of these, namely those measuring 10, 4 and 8, there is no loss of sight and ocular change. In one with a tension of 2 the eye is lost from phthisis bulbi. In one with tension of 6 there is a mature cataract with normal light projection and in one with tension of 8, a posterior cortical cataract is developing.

Elliot (T. O. S. U. K., p. 239, 1918), says that artificially produced hypot-

ony is not necessarily of pathogenic significance. He has observed patients for years with marked hypotony following trephining who have maintained good vision and clear media. A cataract developing in a trephined eye, is not necessarily due to the hypotony.

I cannot agree with this view that prolonged hypotony is harmless. In one of the cases just described, one eye was lost from phthisis bulbi, and the other eye has a mature cataract with an ocular tension of 6. It seems to me that too free filtration is as much to be avoided as none at all, and that hypotony and late infection are real dangers to the trephined eye.

It should be our desire to obtain just enough filtration to keep down glaucomatous tension. Collins is in favor of limiting the size of the trephine hole. Elliot, in his recent book on glaucoma, recommends a two mm. trephine, cutting off only the corneal half of the disc. A varying amount of the disc must thus be excised, according to the amount of desired effect. I feel that a smaller trephine cleanly removing the entire segment, is a better procedure, notwithstanding the possible difficulty of dealing with the iris thru a small opening.

OCULAR MANIFESTATIONS IN CEREBELLAR SYPHILIS.

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SYRACUSE, N. Y.

This paper calls attention to the various types of ocular manifestations that accompany cerebellar syphilis, and discusses their diagnostic value. It also reports in detail a striking but somewhat anomalous case occurring in a relatively young patient.

Cerebellar syphilis while actually but a special clinical manifestation of syphilis of the central nervous system, is yet sufficiently well defined to merit a separate classification, and the increased frequency with which it is being encountered, has justified the use of the term. Many different types of the condition are met with and these could be further subdivided, and no doubt will be, in the future; special attention being paid to the organs or groups of organs which are responsible for the symptomatic phenomena, both subjective and objective.

It is not the purpose of this article to cover a field so colossal, but to call attention to the various types of ocular manifestations as to their diagnostic value. By far the larger number of cases reported have been predominated by ophthalmoplegias of the external muscles, and by pupillary dyscrasias. In connection with these same is usually found some pathologic change in the fundus. Where the external ocular muscles are involved in syphilis of the central nervous system the lesion is usually basal, and the third nerve is the one most frequently involved though this is not always the case, as autopsies on such cases have demonstrated that the lesion may be found at widely variable points, the symptoms as produced being due to a toxemia which seems to have a predilection for the nuclei of the oculomotor nerves.

Pressure paralyses, whether due to gummata, tumors, exudate or periorbitis are apt to be progressive, of long duration, and to affect more than one muscle, while toxic paralyses are transitory, of short duration, and tend to attack single muscles. It is rare indeed to find a well defined case of cerebellar syphilis which does not offer somewhere in the course of the dis-

ease either palsies of the external ocular muscles or pupillary changes or both, and for this reason in the past many such conditions were falsely classified. Yet this is perfectly possible, as a localized posterior cerebellar meningitis will appear at the autopsy table. Ataxia without ocular paralyses has been noted by many observers and while often found to be due to tumors, (1), it can readily be associated with syphilitic lesions of the cerebellum. When ataxias of this type are associated with occipital pain, tumor of the optic thalamus must be suspected (2), as it is seldom that pain is found in cerebellar syphilis.

Changes in the color sense (3) are so rarely met with in this condition and are so closely allied with the psychical disturbances, that their diagnostic value is doubtful. Where they are present, the condition is one of multiple cerebral lesions, cortical, or at some point on the pathway between the cerebral cortex and the retina.

Anomalies of the fields of vision are quite constantly found in connection with cerebellar disease, and must be attributed to an associated lesion of the optic pathway, or cerebral cortex, or to a secondary toxemia; and they must be distinguished from the reductions and scotomata seen in other affections of the central nervous system. A diagnostic feature of importance is the great tendency toward homonymous reductions of the peripheral portions of the temporal fields, absence of central scotomata and failure of permanent lesions. Relative scotomata may, and in fact often do, appear from time to time during the course of the disease; but permanent, or long standing scotomata are rarely met with in cases of homonymous field reduction.

As a rule the media will not be found to be affected unless there is some in-

tercurrent disease of the vascular system, and tho this is common in most forms of luetic disease, it seems to be uncommon in the type here considered. In a series of fourteen cases presenting ataxias of pure cerebellar type, and showing positive Wassermann reactions in which the writer had opportunity of fundus examination, in a French Hospital for venereal cases, only three presented opacities in the media, tho of course it is quite possible that the others may have been so affected at some course of the disease. At any rate it would seem that such changes in the media if present are, like the other ocular manifestations in this cerebellar type, transitory.

Concerning the pupillary reactions, it may be briefly stated that the pupils in cerebellar disease react as a rule, to light and accommodation; which is in exact opposition to the familiar pupillary symptoms in cerebral and spinal syphilis.

Any type of retinitis may be met with, but the majority of observers agree that the retinal lesions are of lesser extent and shorter duration than those found in primary ocular syphilis, or in cerebro-spinal types. The areas of degeneration are usually small and situated in the more vascular portions of the retina, thereby being less destructive to the patient's vision, and also having a greater tendency to recover, because of the better nourishment of the part. Whether the majority of cases have degenerative retinal changes in both eyes as seen in the case here reported, the writer is unable to state, as literature covering this phase is not at present available.

Optic nerve changes are quite constantly found, varying from mild degrees of papillitis to well advanced choked disc. The usual picture is a moderately swollen nerve, the margins obliterated, and the color pale red or reddish gray. The lesion is nearly always bilateral, and of a similar degree in either eye. It undergoes few changes over a rather long period of time, and very often shows marked improvement under treatment. In stubborn cases or those where treatment is

not available at the proper time this condition becomes aggravated and passes gradually to nerve atrophy. The atrophy is not necessarily complete, these patients often retaining a useful degree of vision for many years. The following illustrative case is reported:

CASE.

Mrs. L. was a Hebrew, age twenty. Family history negative. Patient had always been in excellent health during her youth. Married at the age of twenty-one. After two months she was infected by her husband who had, at that time, an active hard chancre. The patient did not realize that it was anything serious, and received no treatment.

Thirty-six months after the primary lesion, the patient began to experience slight dizzy attacks which gradually increased in severity and frequency until she was ataxic to the extent that walking alone was impossible. At this time the case was diagnosed and anti-luetic treatment at once instituted. It was during this period of intravenous therapy that the patient first noticed that her vision was becoming less acute. This rapidly progressed until vision was reduced to light perception, and the counting of fingers at twenty centimeters.

When seen by the writer, thirty-six months had elapsed since the infection, two months since the first anti-luetic treatment, and two months since the failure of vision. Examination at this time gave the following information:

General Condition. Patient, female, well developed, height 5 ft. 6 in., weight 145 lbs. Ataxic to the extent that assistance is needed in walking. Marked Romberg. Knee jerks greatly exaggerated. Ankle jerks present, about normal. No Babinski. No clonus. Cutaneous sensation diminished over anterior surfaces of forearms, elsewhere about normal. Reflexes of upper extremities slightly increased.

Ocular Examination. Careful external inspection disclosed nothing that would lead one to suspect the condition. The external ocular muscles functioned equally and normally

in all respects. There was no apparent abnormality in either the orbicular or palpebral muscles. The pupils were round, equal, and reacted well both to light and accommodation. The corneal curvature was practically equal in all meridians. The cornea, lens, and media were quite clear and transparent, a most rigid inspection failing to find evidence of any opacities.

The fundus of the right eye showed a well advanced papillitis, the outlines of the disc being no longer discernible, and a plus 2 D. lens being necessary to see the vessels clearly. Yet there was not the smooth shelving decline, which is so often seen in cerebral tumor and in increased intracranial pressure cases. The loss of outline of the disc margin in this case probably was due to a swollen retina rather than to an actual increase of the surface of the papilla.

There was a slight venous engorgement and some tortuosity of the superior temporal and nasal arteries. There were also present four minute retinal hemorrhages, the largest of which was but one-half the diameter of the superior retinal vein. The general color of the central portion of the retina was reddish grey, and in a few places it was sufficiently swollen so that the smaller branches of the arteries were here and there buried from view for spaces of half a millimeter.

About half way between the disc and the macula there was a triangular shaped area of retinal degeneration, resembling somewhat in structure the stellar shaped formations found in albuminuric retinitis but which differed not only in shape but also in that each structural element of the triangle was very highly refractive, reflecting the light as though it was a silvered mirror; also each element in the triangle was practically parallel with every other one. The macular region was exceedingly dull, reflecting the light but poorly.

There were no evidences of arterial degeneration as are so often seen in syphilitic retinitis, as white scales or plaques along the course of the arteries. The entire peripheral portions of the

fundus seemed to be normal in all respects as seen with the ophthalmoscope. Perimetric examination was negative, the fields being of fair size and of normal outline. No scotomata were present either central or peripheral.

One of the interesting features of this case is the fact that the left fundus presented a picture almost identical with that seen in the right. The degree of retinitis and papillitis were, as near as observation could determine, the same. The coloring of the retina was the same, the tortuosity of the arteries and engorgement of the veins were of equal degree with that in the right eye, and even the triangular area of retinal degeneration was apparently identical in size, shape, location and refractive brilliancy.

Treatment and Progress. The patient has continued under the care of her family physician, who has kept her on a rigid course of antiluetic treatment. Local ocular therapy is limited to keeping the eyes at rest by means of atropin and a protective glass.

At the end of fourteen days a second examination of the fundus showed a very marked reduction in the papillitis, the surface of the optic nerve being plainly visible with the ophthalmoscope at open sight hole. The circumference of the disc, however, was not sharply defined from the surrounding retinal tissue. The retina also had undergone a reduction in the swelling which was seen at the last examination. The blood vessels were no longer apparently imbedded, but lay free on its surface.

At this time also the patient's ataxia had improved to the extent that she was able to walk unaided, tho her gait was unsteady and her station slightly swaying. Her vision at this time had improved greatly, as she was now able to distinguish large objects at six meters, and by a comparative scale she could be said to have about 6/60 V in the right eye and a little better in the left. No attempt was made at this time to take the corrected vision as the extreme nervous condition pre-

cluded the proper cooperation by the patient. There was no change at this time in the triangular areas of retinal degeneration, as to size or shape, but they appeared to be less highly refractive.

At the end of another two weeks' period the patient was again examined, and no appreciable change noted in the fundus of either eye. Her gait was improving and she had gained weight. An attempt was now made to correct the refractive error with the following results:

Right

Manifest H1.37 D.
Latent H2.62 D.

Total H4.00 D.

Left

Manifest H1.50 D.
Latent H2.12 D.

Total H3.62 D.

H. 0.62 D., Ax. 100°. V. equals 6/12.

H. 0.62 D., Ax. 90°. V. equals 6/15.

Muscle balance and color perception were normal at this time. Perimetric examination revealed no central scotomata, but showed a reduction in each temporal field of vision of approximately thirty degrees. No glass was prescribed at this time, as improvement appeared to be steady and rapid.

At the end of twenty more days, the examination revealed no further change in the fundus of either eye, as far as could be seen with the ophthalmoscope. Careful perimetric charts at this time showed that the reduction in the temporal fields which appeared at the last examination was no longer present, but the entire field was now normal. The patient now accepted the following correction:

R. +3.62+0.62 c. ax. 100° V. 6/6.

L. +3.50+0.62 c. ax. 95° V. 6/9.

Patient's gait at this time was still uncertain, but she walked without assistance. Other symptoms of cerebellar disturbance which still obtained were: faulty station, disturbed reflexes, adiadokinesis, slight speech defect, some emotional disturbance. All these symptoms, however, are improving.

In conclusion it might be said that this case is of unusual interest from the ophthalmic viewpoint because of:

1. The comparative youth of the patient.

2. The rather long period of time which elapsed between infection and the observation of ocular symptoms.

3. The absence of any pupillary changes.

4. The relatively identical fundus picture in either eye.

5. The absence of abnormalities in the external ocular muscles.

6. The rapid improvement of the ocular condition.

Whether the injections of salvarsan in such close succession were the cause of the ocular disturbances cannot be definitely proved. There have been many cases reported where ocular symptoms have been produced by salvarsan, or at any rate were seen synchronously with its use. However it is the writer's opinion that where all the symptoms of definite cerebellar disease are present, together with structural changes in the retina, one is safe in attributing the ocular changes to the same cause as this cerebellar disease.

The symmetric reduction of the temporal fields of vision, occurring late in the progress of the malady, is rather difficult to interpret. Yet it can be fairly definitely stated that such symmetric contractions of the temporal fields is proof of disturbance by pressure or toxins of the crossed fibres in the optic chiasm. Only rarely has this contraction been attributed to lesions of other portions of the tract. It would seem in the above case to be due to a toxemia rather than pressure, because of its short duration, and failure to produce a permanent lesion.

The actual pathology of the cerebellum in such a case as this can only be proved at autopsy. However tumors and gummata can, with a mild degree of certainty, be ruled out, in as much as such are apt to produce ophthalmoplegias at some time during their course. Even if such a lesion was present without the typical external muscle palsies, its effects would hardly

be as transient as those seen in this case.

Such fleeting ocular manifestations are generally the result of some toxic agent, as are the cerebellar symp-

toms in mild cases where the picture is one of syphilitic periostitis or even localized meningitis, and it is the writer's opinion that such is the case just reported.

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EXPERIMENTAL PRODUCTION OF IRITIS AND ITS TREATMENT WITH FOREIGN PROTEIN.

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MINNEAPOLIS.

This paper briefly reviews the varied etiology of iritis, and the good results claimed for its treatment by different serums. It then reports a series of experiments performed upon rabbits in the Departments of Ophthalmology and Bacteriology in the University of Minnesota, to produce iritis of a definite severity, and observe the effects upon it of treatment by the injection of whole milk, concluding we may expect good results from this treatment where no definite positive focal infection is recognized.

The etiology of iritis has for many years occupied a prominent place in the literature. Reber (1) in a very complete review finds that most authors attribute a large percentage of the cases to syphilis (30 to 60%) and the remainder to rheumatism, gonorrhea, scrofula, tuberculosis, autoinfectious diseases, disorders of metabolism, and traumatic and sympathetic causes.

He states that with modern laboratory methods, such as the complement fixation test, five organisms could be identified as sustaining a causative relation to iritis. These are the spirocheta pallida, the gonococcus, the pneumococcus, the tubercle bacillus, and the influenza bacillus.

Each of these varieties responds quite well to specific treatment but the iritis of nonspecific characterization and obscure etiology, which resists ordinary therapeutic measures and in which class the so-called rheumatic iritis properly belongs, is the type which appeared to the writer as one which would offer an excellent field for the exhibition of foreign protein therapy, and it was with this in view that he has attempted the experimenta-

tion which forms the basis of this paper.

Brown and Irons (2) report a series of 100 cases giving as the chief causes not one but several factors, i. e., focal infections of the mixed type.

Poynton and Paine (3) isolated a diplococcus and experimentally produced an iridocyclitis which was regarded as a true rheumatic iritis.

These observations were confirmed regarding acute rheumatic iritis by Rosenow (4).

Marked improvement in the treatment of hypopyon keratitis by the use of bacterins is reported. The pneumococcus was used by Römer. (5) He also used autoserum therapy, the serum being obtained from a blister on the patient's arm.

Antistreptococcus serum has also been employed, as has also antistaphylococcus serum. Darier (6), Zimmermann (7), and Fromaget (8) have used antidiphtheric serum with success. Deutschmann (9) reports good results from the use of yeast serum, and the results from the use of bacterins and vaccines by de Schweinitz (10) have been of "surprising value."

Evidently the employment of such a great variety of serums indicates that it is not the specific antibodies in the serum which is responsible for the improvement noted, but rather it could be more clearly attributed to the protein content of the serum. If this be true, it would remain for the experimenter to find a single protein or protein-containing substance which would give the best antibody liberation for the infection in hand.

A good report of the clinical use of foreign protein in eye infections is that of Müller and Thanner (11) who used whole boiled milk. They report very favorable results in eleven cases of primary iritis, the cause of which was ascribed to rheumatism; two cases of gonorrheal iritis; four cases of parenchymatous keratitis from inherited syphilis showing no improvement from specific treatment; and one case of gonorrheal conjunctivitis.

Now, when we come to consider the treatment of experimental iritis with foreign protein, we find that there has been, up to the present time, practically no work reported, and we are at once confronted by two problems: first, that of localizing the infection in the iris alone, and, second, that of producing a similar degree of infection in one or more animals at the same time. It was exceedingly difficult to devise a technic by which the infection could be entirely localized in the iris, for the majority of the cases of iritis were accompanied by a more or less severe conjunctivitis, in spite of the use of every precaution to prevent the latter.

EXPERIMENTS.

The following procedure was finally developed with a fair degree of success. With a fine hypodermic needle, puncture was made at the corneoscleral margin, going into the base of the iris and as close to the anterior surface of the iris as possible. Then, .05 to .1 cc. of a suspension of the bacteria in salt solution was injected, the needle rapidly withdrawn, and the eye thoroly washed with boric acid solution.

The other difficulty consisted in pro-

ducing the same degree of infection in two or more animals, and many series which were started had to be abandoned because of inability to produce the proper control. In the series of cases herein reported, where there existed a difference in the severity of the infections, I used the severest cases for the treatment and the less severe for the control, and thus no advantage for the treatment could be claimed that was not justly due it.

The organisms used were staphylococcus aureus, streptococcus hemolyticus, and streptococcus viridans. Often the inoculations were repeated several times, in spite of the fact that the organisms were very pathogenic for the human, being taken from cases of septicemia, otitis media, and from the dental pulp of extracted decayed teeth. There appears to be quite a high resistance in the iris of the rabbit, altho the fact, that organisms can be recovered from injections of septic material into the anterior chamber of a rabbit's eye, when growth can be obtained in no other way, is well known.

The following series serve to illustrate the results of the treatment, and, of course, the results must be interpreted upon objective signs alone, which may or may not be a disadvantage.

SERIES I.

Rabbit #3 (control).

- Feb. 3. Injection staph. aureus into left eye.
- Feb. 4. Severe iritis.
- Feb. 12. Iris beginning to clear.
- Feb. 14. Further improvement.
- Feb. 18. Eye cleared up.

Rabbit #4.

- Feb. 3. Injection staph. aureus into left eye.
- Feb. 4. Very severe iritis.
- Feb. 7. Intravenous injection 1.5 cc. whole boiled milk.
- Feb. 8. Improvement.
- Feb. 9. Iris clearing.
- Feb. 12. Eye cleared up.

Rabbit #5.

- Feb. 3. Injection staph. aureus into left eye.
- Feb. 4. Severe iritis.

Feb. 5. Intravenous injection 1 cc. whole boiled milk.

Feb. 7. Marked improvement.

Feb. 9. Eye cleared up.

In this series it will be noted that in the treated animals the course of the infection was shortened by one third and one half the time, respectively, of the untreated animal.

SERIES II.

Rabbit #17 (control).

March 5. Injected staph. aureus into right eye.

March 6. Severe iritis.

March 7. Panophthalmitis.

March 8. Rabbit died of meningitis.

Rabbit #18.

March 5. Injected staph. aureus into right eye.

March 6. Severe iritis.

March 8. Injected 1 cc. whole boiled milk intravenously.

March 9. Improvement.

March 11. Animal very sick.

March 15. Rabbit died of meningitis.

The treatment in this series might be said to show some temporary beneficial effect, but it is doubtful.

SERIES III.

Rabbit #21.

April 2. Injected streptococcus hemolyticus into right eye.

April 3. Moderately severe iritis.

April 6. Intravenous injection 1 cc. whole boiled milk.

April 7. Marked improvement.

April 9. Eye cleared up.

Rabbit #22 (control).

April 2. Injected strep. hem. into right eye.

April 3. Moderately severe iritis.

April 8. Some improvement.

April 13. Condition same.

April 17. Further improvement.

April 18. Eye cleared up.

SERIES IV.

Rabbit #32 (control).

May 6. Injected strep. hem. into left eye.

May 7. Severe iritis.

May 9. Condition same.

May 13. Improved.

May 14. Animal quite sick.

May 18. Animal died of meningitis.

Rabbit #33.

May 6. Injected strep. hem. into left eye.

May 7. Severe iritis.

May 10. Animal very sick.

May 13. Much improved.

May 15. Injected 1 cc. whole boiled milk.

May 20. Eye cleared up.

SERIES V.

Rabbit #39.

May 20. Injected strep. hem. into right eye.

May 22. Severe iritis.

May 26. Intravenous injection of 1 cc. whole boiled milk.

May 27. Improved.

May 31. Injected 1 cc. whole boiled milk.

June 2. Eye cleared up.

Rabbit #40 (control).

May 20. Injected strep. hem. into right eye.

May 22. Moderately severe iritis.

May 26. No change.

May 31. Condition about same.

June 2. Improved.

June 4. Eye cleared up.

In this series the treated animal had a much more severe infection than the untreated animal. The course of the infection was two days shorter than in the untreated animal.

SERIES VI.

Rabbit #46 (control).

May 23. Injected strep. viridans into right eye.

May 24. Severe iritis.

May 28. Condition unchanged.

June 2. Improved.

June 8. Eye cleared up.

Rabbit #47.

May 23. Injected strep. viridans into right eye.

May 24. Very severe iritis.

May 28. Injected 1 cc. whole boiled milk intravenously.

May 31. Marked improvement.

June 4. Eye cleared up.

In this series the course of the severest infection was shortened four days.

Thus it would seem that the results which have been obtained indicate that the course of the disease or infection is materially shortened in some instances,

and only slightly influenced in other instances. but when we remember that in the latter, without treatment, we could rightly expect the course to continue much longer, even twice as long, since the severity of the infection was twice as great as in the untreated cases, we can safely assume that the results were not negative.

Furthermore, I believe that the results are sufficiently encouraging to warrant the trial of foreign protein therapy clinically in certain cases of iritis. It would undoubtedly be applicable in certain selected cases which resist ordinary forms of treatment, in which the etiology is indeterminable, or in those cases which are of the so-called rheumatic variety.

It is possible that a more suitable protein mixture than whole milk could be used. There is a wide variation in antibody response to different proteins as has been demonstrated by S. F. Herrmann (12), who showed that such

proteins as human serum, typhoid vaccine, human ascitic fluid, and guinea pig serum were good antibody producers.

Milk has the distinct advantage of being convenient and easily accessible, but such an advantage should not militate against the use of more perfect protein mixture, and further experimentation on this point should be done.

CONCLUSION.

The foregoing series appear to substantiate quite well the conclusion that there was a definite response to the treatment, and, while the series are not sufficiently extensive to merit general acceptance, yet I firmly believe that the principle involved is based on scientific facts, its practical exhibition has been quite definite and clear cut, and, moreover, we have a right to expect good if not excellent results in those cases of iritis in which definite foci of infection cannot be found or demonstrated.

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ATYPICAL COLOBOMA OF THE IRIS AND CHOROID.

SANFORD R. GIFFORD, M. D.,

OMAHA, NEB.

The case here reported is of small cornea, coloboma of the iris up and slightly out, and coloboma of the choroid, beginning above the disc and extending upward to the limit of the visible fundus. Other cases of atypical coloboma are cited with the embryonic studies dealing with clefts in the optic cup. It appears that such clefts are multiple at the start, and that the persistence of one usually disappearing early is the most likely explanation of such atypical colobomas. A bibliography is appended.

REPORT OF CASE: Stella K., aged 15, was refracted March 14, 1907, and has been seen several times since, till her present age of 27. Her left eye has vision of 20/15. Her right eye sees 20/200, not helped by glasses. The left eye is normal in appearance, except that the pupil is slightly up from the center, though it is perfectly round. The cornea is 11 mm. in diameter. The fundus is normal. The right eye has the anomalies to be described. (See Fig. 1.) The patient says this eye has been the same since birth, and neither eye has changed during our observation of them. There is no history of any such anomalies in the family. The cornea of the right eye is smaller than that of the left eye, $9\frac{1}{2}$ mm. in diameter, but round. The right iris is a dark-

contracts to light, as does the part of the coloboma nearest the pupil, but not the upper part. The fundus (See Fig. 2) shows a coloboma of the choroid, including about 30 degrees of its circumference, which begins 5 P. D. from the disc, and extends directly up as far as can be seen with the pupil widely dilated. The borders are sharply marked by a brownish line of pigment.

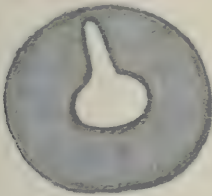


Fig. 1. Upward Coloboma of Iris. (Gifford's case).

er green than the left iris, and shows a diminution of the normal markings. There is a coloboma of the iris, extending up and very slightly out, nearly to the ciliary body. The pupil is bordered by a darkly pigmented stripe, which also borders the pillars of the coloboma.

The upper extremity of the coloboma is 1 mm. wide, the widest point at the edge of the pupil is 3 mm. wide. The iris is completely absent in the extent of the coloboma. A rim of iris $\frac{1}{2}$ mm. wide is left between the upper extremity and the ciliary body. The pupil

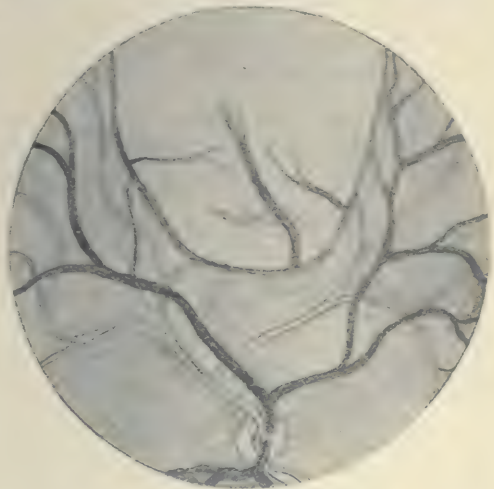


Fig. 2. Upward Coloboma of Choroid (Gifford's Case.)

The border nearest the disc is rounded. In most of its extent, the coloboma is glittering white, but in the lower part there is a crescentic area marked by fine black pigment spots. A large choroidal vessel starts at the lower inner end of the coloboma, and runs up and out to near the center of the white area, where it spreads out into a broad dash of red and is lost in the sclera. A few other vessels strike across the lower half of the coloboma.

LITERATURE: As to the occurrence of just such cases as this, I have not

been able to find any other case in which coloboma of the upper half of the iris was accompanied by coloboma of the choroid in the same direction. In Hess' case (1) there was bilateral coloboma of the iris in and up, with typical coloboma of the choroid down, in the right eye only. Mittelstadt's case (2) had bilateral coloboma of the iris in, with coloboma of the choroid down and slightly in. These cases are in a different class, and will be referred to later.

I could find only four cases in which atypical colobomata of iris and choroid in the same direction were associated. These are that of Adams Frost, (quoted in Parsons) (3); in which both defects were directed out; that of Nuel and Leplat (4) out, with coloboma of the nerve also; and that of Steinheim (5) in. G. M. Van Duyse (28) this year reports a careful histologic examination of an eye showing coloboma down and in of the iris, choroid, and sheaths of the optic nerve, associated with posterior lenticonus, coloboma of the upper lid, and right-sided hare lip. The central artery entered the nerve at the nasal side, slightly down; the insertion of the internal rectus was above that of the external and the insertion of the inferior oblique was nasal to its normal insertion. While accepting as disproven Vossius' theory of a normal rotation of the eye-angle, the author thinks the above facts make probable in his case an abnormal pushing of the upper segment temporally in its growth, which caused the fetal cleft to rotate nasally.

Coloboma of the upper half of the iris, occurring alone, is no rarer than atypical colobomata in other directions. The literature on atypical colobomata of the iris has been so well summed up by Parsons, (3) in 1906, and by E. v. Hippel in 1901 (6) that it seems worth while to mention only a few later cases, that of de Schweinitz (7) in which the defect was bilateral up and out; Yamaguchi (8) up and in; Pastega (9) up and out; Purtscher (10) up; Faber (11) up; Gilbert (12) down and in; Gilbert (12) up and in; Van Duyse, Sr.

(30) in; Bertozzi (31) bilateral out; Sawitsch (32) out; Cosmettatos (33) down and out.

Atypical coloboma of the choroid alone is rather rare. Parsons has collected eight such cases, to which I can add those of Derby (13) 1907, and Roschowski (1906). These of course, do not include cases of central, or macular coloboma, but only defects in an atypical direction resembling more or less the typical colobomata downwards. The defects were up in the cases of Rindfleisch (14) and Derby (13); up and out in those of Lang (quoted in Parsons) v. Hippel (15) and Lindsay Johnson (16), (with coloboma of nerve, same eye, and macular coloboma, other eye); out in those of Pflüger (17), Nuel (Parsons) Pfannmüller (Parsons); and Roschowski (Peters) (29); and down and in, in the case of Randall and de Schweinitz (18).

More interesting from the point of view of the genesis of atypical colobomata are the cases in which an atypical defect of the iris was associated with a typical coloboma of the choroid. Mittelstadt's case (2) above described, showed coloboma of both irides straight in, and of the left choroid down and in, almost at the position of a typical coloboma, the two defects forming almost a right angle. In Hess' case (1) the iris defect was bilateral in and up, with typical choroidal coloboma down in the right eye. There was a notch in the border of the lens at the site of the iris defect.

Even more significant are the cases of multiple coloboma of the iris, when taken together with recent embryologic findings. v. Hippel (6) describes an unpublished case of Leber's with three colobomata of the iris; up and in, up and out, and down and out. In Mooren's case there were two defects, one in and one out; in Manz' case, one out and one down; in Magnus' case (19) one in and one down. v. Hippel mentions also Williams' two observations of two colobomata of the iris in the same eye, but gives no further details. Parsons describes other cases: in and out (Lerche); down and in (Tortual);

down, and in (Emers). Burstenbinder's case (34) showed complete colobomata of the iris up and down, left eye, with complete coloboma in and down and superficial coloboma out, right eye. Galezowski (35) saw double coloboma, one up, and one down and out, occurring symmetrically in both eyes. Chodin (in Lindahl) saw bilateral double coloboma, each eye having one coloboma in and slightly down, and one up and out. Of interest is Jensen's case (36) isolated so far as I know, in which 2 colobomata of the iris, one down (typical) and one up and out, were associated with a choroidal coloboma in the same direction (atypical) as one of them (up and out). The latter was typical in appearance, and extended to within 2-3 P. D. of the disc. Observations in animals include the triple partial coloboma, most complete downwards, which Bock observed in a pig; colobomata down, and up and out in a fowl (v. Ammon); and three cases of Bock, in pigs; which showed, besides typical colobomata down, slight indentations of the upper pupillary margin suggesting partial colobomata up. Of these 17 cases, in eleven one of the defects was in the typical position, while in four this point could not be ascertained. In none of these cases, apparently, was the choroid involved, but multiple defect of it also has been noted in embryologic findings to be referred to.

Manz, in 1888 (20), had considered the convenience of assuming an atypical accessory fetal cleft to explain atypical colobomata, but decided that so long as evidence of such a cleft was lacking, no theory could be based on it. Since his time a good deal of evidence pointing in just this direction has been supplied.

In 1858, v. Ammon (21) had already described, in embryos of two chicks and one sheep, accessory choroidal fissures. In one of the chicken embryos, besides the typical cleft down, there was another complete, but smaller one, from nerve to ciliary body. In the second chick, the accessory cleft was complete upwards. In the sheep embryo, it appears from the cut to be not quite

complete upwards, with the typical defect complete downwards. He says that Warnatz at the same time described a similar condition (in the chick?) and that Emmert had earlier seen it in amphibians. These were considered pathologic rarities, and not sufficient basis for any generalizations. In 1901, van Duyse (37) described accurately a bilateral accessory cleft in a 13.5 mm. calf embryo. The normal fetal cleft was still open in both eyes, and the second cleft, extending down and out (R. E.) and down and in (L. E.) nearly to the equator of the globe, was filled with mesoderm continuous with that outside the optic cup. No vessels were seen in the depth of the clefts. He suggested that this second cleft might remain open while the normal one closed, leaving an atypical coloboma. He suggested that such accessory clefts offer an explanation of atypical colobomata, including not only colobomata of the iris, but also of the choroid, such as those of Randall and de Schweinitz and Nuel and Leplat, and even macular colobomata.

v. Szily (22), in 1907, described a similar bilateral defect in a human embryo of about 4 weeks' growth, with model. The fetal cleft was closed in the middle in both eyes. The atypical defect in the edge of the optic cup was directed in both eyes down and in, and was of the same depth as the anterior unclosed part of the fetal cleft. In the deepest part of both clefts, sections showed a branch of the ring-artery. The author describes the normal anastomoses between the hyaloid artery and the branches of the ring-artery about the rim of the optic cup, which are fairly numerous. It is larger and more persistent anastomoses such as this, he believes, which by obstructing the forward growth of the lips of the optic cup, cause these accessory clefts or depressions. If such a vessel undergoes involution soon enough, the lip of the optic cup at the point of previous obstruction grows again, and the rim of the cup becomes smooth, as he believes does occur in many cases. If the vessel persists, however, the defect in the optic cup will also per-

sist, and may form the basis for a coloboma. He emphasizes the essential difference between such clefts and the normal fetal cleft, the former never extending past the equator of the globe. Thus they may account for colobomata of the iris, and sometimes of the ciliary body, but never of the posterior parts of the uveal tract.

In 1908, Wolfrum (23) going over his old material with v. Szily's observations in mind, discovered fairly often, in the embryos of rabbits and pigs of 13-16 mm., an accessory indentation in the rim of the optic cup. This was usually nasal to the normal fetal cleft, in the lower segment, and having no connection with it. The indentations varied in depth, involved the inner layers of the cup more deeply than the outer, and none were seen to extend past the equator of the globe. Besides these nasally directed clefts, he found in one pig embryo of 13.75 mm., a bilateral accessory cleft of a considerable depth directed straight up. These indentations appeared to be short lived, as none were found in rabbit embryos 14 days old, or pig embryos over 17 mm. in length. He found vessels in the indentations, as v. Szily did, but in the older embryos he also found these vessels passing over the smooth edge of the cup, and believed that where indentations had formerly been present, the vessels had been pushed out by the growing retinal tissue. He notes that van Duyse found no vessel in his cleft, and believes that the vessels may not present the essential cause of the indentation, but that they may simply be left in the deepest parts of the rim of the cup by the faster growing tissue at the edges of the indentations. The indentations themselves, then, may be formed when some part of the edge of the cup, for some unknown reason, lags in its growth behind the rest of the edge. (This is the same sort of argument which has arisen, as Professor Poynter of the University of Nebraska has pointed out, over the question whether or not the vessels found in the convolutions of the brain are the cause of these convolutions. I

think it is generally admitted that they are not.)

Wolfrum describes Rabl's human embryo of about the fifth week, which showed, besides the normal fetal cleft, two indentations of some depth nasal to it, and another much deeper one straight up, considerably deeper than the defect down and in of v. Szily, and which must, then, have reached or passed the equator of the globe. Seefelder, in Bach and Seefelder's Atlas, 1911 (24), gives a short chapter on "Einkerbung des Becherrandes" in which he accepts v. Szily's view that the vessels are the cause of the temporary obstruction to the growth of the cup at some point. His figures show such an accessory indentation up and to one side (which side not clear from figure) in a human embryo of 5 mm. described by him. Another figure shows Robt. Meyer's 9 mm. human embryo with a similar defect straight up. Seefelder believes that when the obstruction persists, colobomata of the iris and ciliary body may be formed.

The latest contributor in this direction is Lindahl (25) (26) who in 1912 published the results of work on embryos of man, lower vertebrates, birds and the lizard. This extensive and careful work included making models from complete serial sections of 20 human embryos from 3.4 to 31.1 mm. in length, and 28 embryos of mammals, birds and the lizard at about the same period of growth. These models showed with remarkable constancy the presence of 4 distinct accessory clefts besides the normal fetal cleft. They were, aside from a few variations, arranged fairly symmetrically around the pupillary opening, extending down and in, up and in, up and out, and down and out. The cleft down and in and the one up and out were constantly found to be deeper and more persistent. Thus the pupillary opening was bounded by five rounded sides, the lower two of which later flattened out to one straight side interrupted by the slight depression of the fetal cleft. The clefts are clearly marked in 7.7 mm. human embryos, deepest at about 10 mm. and still clearly pres-

ent at 17.1 mm. In older embryos, they become shallow and rounded, till at 31.1 mm. the opening is almost round. The same was found in the lower animals examined, the depressions being less marked in birds and the lizard. In human embryos the clefts never extended past the equator, tho often a shallow furrow was seen extending back past this along the outer surface of the cup, especially in the direction up and out. The author concludes that these accessory clefts are not, as v. Szily, van Duyse, and others had supposed, merely adventitious defects occurring rarely, but that the five-sided pupillary opening with four clefts besides the fetal cleft, represents a normal stage of development. Wolfrum had already suggested, from the frequency with which he found the defect down and in in rabbit and pig embryos, that it must be fairly common, but did not suggest it as a normal stage of development. It will be noted that the defect he found most commonly corresponds to one of the two which were most marked in Lindahl's models. Lindahl suggests as reasons for this condition not having been previously noted, the fact that investigators have often cut their sections in directions which would not show these defects, that in their series many sections were often missing, and that few models have been made by the serial section method. He concludes that the presence of these clefts in fetal life, any one of which might persist from some cause, will explain atypical colobomata in any direction. Atypical choroidal colobomata associated with iris defects, he explains as obstruction to closure at a very early stage, or possibly defects of greater extent than the original cleft, similar to the typical colobomata which extend above the papilla, tho the fetal cleft never does. Bridge colobomata may be explained, he says, as a fusing of the defect at one place only.

DISCUSSION: One important fact which seems to be made incontestable by observations of recent years is that atypical coloboma of the iris and choroid has usually nothing to do with

the normal fetal cleft. The attractive theory of its rotation (Vossius) has been disproven by the discovery that the fovea is not developed in the fetal cleft (Chievitz), and by the occurrence of atypical colobomata in the same eye with typical ones. These last would also disprove the theory of an anomalous direction thruout fetal life of a single fetal cleft, at least so far as these cases of multiple defect are concerned. In G. M. van Duyse's case, the evidence is strongly in favor of an abnormal rotation of the eye, with the fetal cleft. Tho no such evidence is offered in any other cases, some of the atypical defects of the lower segment might be conceivably due to this, especially those such as Mittelstädt's, where the defect was near the typical position. There is no evidence that such rotation could explain defects of the upper segment. Deutschmann's theory of an intrauterine inflammation in the region of the fetal cleft may explain some typical colobomata, but is being abandoned even for these cases, as so many of them show no clinical or histologic evidences of former inflammation, and the frequent occurrence of a bilateral inflammation in this region alone is hard to believe. At any rate the theory will not explain atypical defects, which are independent of the fetal cleft. It was Hess' idea that persistent bands from the vascular fetal membrane of the lens caused colobomata of the iris, and that the abnormal development of the connective tissue in the framework of the eye which caused this persistence, might also obstruct closure of the normal fetal cleft and produce typical coloboma of the choroid such as he found. This is consonant with the number of cases which have had remains of the pupillary membrane present with coloboma, and with v. Hippel's conclusion (27) that mesoderm growing into the fetal cleft and persisting long enough to hinder development of the membranes is the main factor in producing typical colobomata. And a certain interpretation of this view seems reconcilable with the embryologic findings above described

in helping to explain atypical colobomata.

In view of the accumulating embryologic data, it can be certainly said that accessory clefts at various parts of the secondary optic vesicle do occur in fetal life, and that they are not so rare as has been supposed. Taken with the observations of multiple defects seen after birth, typical and atypical, it seems logical to believe that these accessory clefts may cause atypical colobomata persisting after birth. v. Szily has claimed that this could be true only of defects of the anterior segment of the eye. The mechanism of such persistent defects would appear to be most logically found, as it has been found for typical colobomata, in the pushing of mesoderm into such an indentation of the rim of the cup. It may even be that this abnormally vigorous growth of mesoderm pressing on the rim of the cup is what causes its failure to grow ahead at one point, and so produces these indentations.

Whatever the cause of the defect, persistent vessel, primary lag in growth at one point of the cup, or push of abundant mesoderm, it is certain that where such a cleft might exist, mesoderm, usually vascular, would push in to fill it. As this mesoderm later involuted, it might leave bands such as Hess described which would hinder iris growth, tho the bands themselves might later atrophy and leave no traces. While v. Szily states

that the defects never pass the equator, v. Ammon's and Warnatz' cases of multiple choroidal colobomata would seem to be instances to the contrary. The defect upwards in Seefelder's 5 mm. human embryo if persistent, might cause a defect fairly far back in the choroid. Theoretically, it is conceivable that the lagging growth, whatever its cause, might begin at any stage in development of the optic cup, when it was hardly a cup at all, and that such a defect might allow mesoderm to enter the cup which would persist and cause a defect very deep in the choroid. Van Duyse and Lindahl suggest such possibilities. While this must await further evidence for proof, I know of no more likely theory with which to explain the atypical colobomata of the choroid such as that in the present case, which we know do exist with similar defects in the iris.

My excuse for presenting this case and the discussion of the literature at such length is the chance of having observed what I believe is the first case reported of coloboma of both iris and choroid up, with the fact that I have nowhere found a summing up of recent evidence, especially embryologic evidence, for what seems to be the most likely theory to explain it.

Since finishing the first draft of this paper, I have seen Lindahl's article, which covers much the same ground. It seemed, however, that it was not so generally known as to make this discussion entirely superfluous.

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MULTIPLE VACCINATION OF THE EYELIDS

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A case of this unusual complication of vaccination is here reported with comments upon it; and an extended bibliography is appended. This paper was read before the American Ophthalmological Society, June, 1919.

There are two reasons for presenting this case to you—one, that as far as the records show no such report has been given this society, and the other, that altho vaccination is common, comparatively very few eye complications are noted.

The infrequency of eye involvement following vaccination is very striking when we consider the number of vaccinations, the doubtful handling that many receive, and the ease with which infection may be transferred. This ease of transference by slight contact is detailed by Clarke. He reports four members of a family slept in the same bed, after a recently vaccinated child, all but one developing vaccinia. In Schapringer's case, a physician patted the face of his patient, who later developed ocular vaccinia.

The severity of complications varies—the loss of an eye has been noted many times. One eye was destroyed in cases reported by Calhoun, Betti, Schwabe, and Doehler; both eyes by Tilly in a case of pemphigus. Corneal involvement with opacities interfering markedly with vision is described by Morax, Snyder, Schmitz, Knaggs,

and Block. Lid deformities are numerous, from the pale areas without cilia to adhesions of lid or lids to the globe. Mark reports a symblepharon, and both he and Thompson ankyloblepharon.

A review of the literature shows that altho the majority of the cases have been mild, nevertheless very serious complications may follow this seemingly simple lesion, and further that the severity of eye change does not always have a direct relation to the patient's previous history of successful or unsuccessful vaccination.

When seven years old, our patient was unsuccessfully vaccinated. A year later the result was the same.

CASE: Mrs. A. H., married, aged thirty-one years, was brought by her physician, Dr. Walter A. Reynolds, to the office September 16, 1918, with a history of having had hay fever since the early part of July, with much irritation of her eyes and intense itching.

On August 27th her young son was vaccinated on the left arm. The patient had been caring for his wound, but had always carefully washed her hands immediately after the dressing,

with the one exception of the afternoon of September 8th, when she is positive that she rubbed her right eye, without washing her hands, immediately after dressing the boy's arm. On September 12th, when she awoke in the morning, the right eye was swollen and the lids closed, which, as she says, "was like a watery blister and the pupil lay back in it." Ice compresses

an ulcerating surface including the loss of the cilia, for an area of about 10x4 mm. The margins of the ulcer were not undermined, altho its base was covered with a tenacious, dirty-gray, and somewhat adherent membrane. Surrounding the ulcer was a definite zone of infiltration and the entire lid was greatly swollen and congested. The upper lid was markedly reddened.

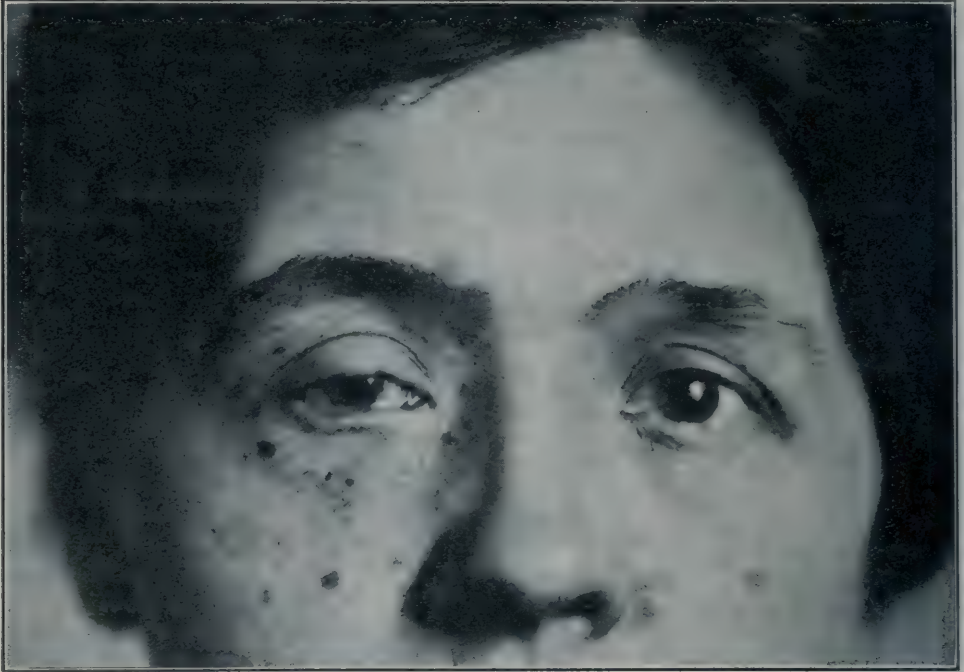


Fig. 1. Shows distortion of lower lid, the site of the scar in the right eyebrow and the smooth surface of the left lower lid.

were used constantly. The edema entirely disappeared, altho the eye remained red and watery. The swelling, which again returned on the fifteenth, did not subside under ice, and it was impossible for the patient to even forcibly open her lids. Between September 12th and 15th she noticed an enlargement in front of her right ear. Her physician first saw her on the fifteenth, and, as the treatment had no effect on the local swelling, brought her to me the next day.

Examination—September 16, 1918: Right eye: The middle two-thirds of the lower lid margin was rough, with

Congestion of the bulbar and palpebral conjunctiva with moderate blepharospasm and photophobia. A slightly stringy, mucopurulent secretion collected in the lower culdesac. Cornea clear; pupil 4 mm., regular and active. Both preauricular and postauricular glands were decidedly swollen and tender. The left eye was negative.

Two days later, on the eighteenth, a definite 6 mm. vesicle, the scar of which is evident in the photograph, was seen almost at the nasal margin of her right eyebrow. The right eye showed a greater loss of lower lid tis-

sue, with two distinct macerating areas on the upper lid margin. These were watery gray degenerating vesicles. The swelling of the entire right side of the face was considerable, but it was possible to open the lids without the use of elevators. The cornea remained clear. There was very slight conjunctival secretion, altho the grayish membrane remained adherent to

with 96 pulse and by evening reached the highest point, 102° F.

The entire right side of the face and neck was congested with intense edema, and a profuse serous discharge from the eye was present. The lower lid was so tense that the large ulcerating surface, now 25x10 mm., was in contact with the cornea, producing a slight superficial haze.



Fig. 2 Shows resulting adhesions between lid and eyeball.

the lower ulcer and the induration persisted.

The left eyelids were affected, a small 7 mm. vesicle on the upper lid, 9 mm. from the external canthus, and one on the lower lid, involving practically the outer half of the lid margin, so that the left eyelids presented the picture of the right when seen two days before.

From the first the patient complained of intense ocular pain followed by marked prostration which confined her to bed from September 20th to 30th. The temperature was but slightly elevated until the morning of September 21st, when it was 101° F.

The left lids were so swollen as to be blanched by pressure, while the two ulcer areas were less macerated.

On September 26th, the tenth day of observation, the firm swelling of the right temporal and malar regions was so painful that two incisions, 12 mm. long, were made, one above and the other below the external canthus. The profuse serous flow decidedly relieved the condition, altho lid elevators were necessary even partly to expose the cornea.

The vesicle in the right eyebrow was beginning to heal, and the ulcers on the left eyelids were drying, with

marked decrease of the surrounding congestion.

Two days later—the twelfth day—the right corneal opacity was greater, with interstitial infiltration. The swelling of the lids was slightly less. The left eyelids were practically healed, with the exception of a small area without epithelium on the lower.

On September 30th—the 14th day—the cornea perforated, with a minute opening 3 mm. below the apex. From that time the right eye improved rapidly. The swelling was greatly reduced each day, so that lid elevators were no longer needed to view the cornea. The glands were no longer palpable, and the pain had disappeared.

By October 1st a symblepharon of practically the entire lower lid and eyeball gave the patient much discomfort by lachrimation and photophobia. The annoyance steadily lessened, and the anterior chamber quickly reformed without iris adhesion.

On November 9th vision of the right eye was 20/200, with a diffuse corneal haze of the inferior central portion. The lower palpebral conjunctiva still remained swollen. The scars on the eyebrow and on the upper and lower left lids were smooth but still congested. The left eye: Pupil 4 mm., regular, active, disc clear, vision 20/15, and except for the two areas where the cilia are absent shows no ill effect.

On February 5, 1919, the patient was operated upon under ether. The right lower culdesac was dissected to the inferior orbital margin, two large flaps of rabbit's conjunctiva were sutured one to globe and the other to the lid. The latter held deeply in the culdesac by sutures thru inferior orbital margin periosteum and tied on the cheek. Healing was uneventful, and the result a freely movable comfortable eye.

On May 26th the patient's vision of the right eye was 20/30 (?) with correction for compound hyperopic astigmatism, full 20/30 and Jaeger 1. There was slight conjunctival injection with a tendency for the few remaining cilia at the inner canthus of the right lower lid to irritate the cornea.

COMMENT: The differential diagnosis was of considerable interest at first and later. The immediate primary thought was an initial lesion or diphtheritic conjunctivitis, the former because of the firm induration about the ulcer and the latter because of the adherent membrane. To appreciate the making of a correct diagnosis it must be remembered that neither the detailed history above recited was then obtained nor was there anything to suggest the later proved cause.

The following conditions have been confusing to others having similar cases: Diphtheria, herpes, pemphigus, hard chancre, soft chancre, malignant pustule, tuberculous conjunctivitis, erysipelas, trachoma, and gonorrheal ophthalmia.

Our diagnosis was made by the history and typical vesicles that secondarily involved the eyebrow and left lids. Blood reaction being normal, conjunctival smear not presenting Löffler bacillus, Ducrey bacillus, Neisser organism, anthrax, or streptococcus, many of the confusing diagnoses were immediately excluded and our attention drawn to clinical proof of our diagnosis. As you all know, Guarnieri claimed that vaccinia of the cornea produced a definite cell grouping, but unfortunately this was disproved by other observers, including Wasielewski. The only other process was to vaccinate a calf's udder and note the lesion. We were ready to do this when the patient developed the typical diagnostic vesicles, making further research unnecessary.

To summarize this case, the patient, three days after known contact, developed her first symptom; having no immunity, the infection was unusually severe, and the individual lesion, altered by the tears, was masked. Ten days after known contact the other lesions developed and they passed thru the usual stages of vaccination vesiculation with congestion and gradual drying until finally a smooth white scar remained. The corneal pressure change, extremely alarming at one time, was finally cured with excellent result, and the lid and

globe adhesion mechanically separated.

The appended bibliography, complete as far as it is possible to make it, with the books in this country, em-

braces all cases since the introduction of vaccination. Therefore this seems to be the ninety-third case of ocular change following vaccination.

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LOSS OF RETINAL PIGMENT (APHYKIA RETINAE).

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This paper reports a case belonging to the class of disorders of pigmentation just beginning to attract the attention they deserve. It proposes a name by which such case should be designated.

CASE: D. C., daughter of G. C., Superior, Wis. Referred by a local optician. Feb. 18, 1918. Age, 8 years, 2 months. Nationality, Scotch.

Family History: Father and mother living and in good health. No other children.

Personal History: Patient had measles at 4 years of age. Has always been troubled with earache and colds in the winter. Ears have never discharged. Has had several attacks of tonsillitis. Two months ago was quarantined for scarlet fever for a period of three weeks. Before that time had never had eye trouble.

Present Complaint: Since recovering from her attack of scarlet fever patient complains of eyes hurting and running water, also of inability to see the blackboard at school. She has had several pairs of glasses, but none have seemed to help her.

Examination: Slight congestion of lid margin, and scaling along the eyelashes. Conjunctival irritation. Pupils 2-3 mm., react promptly to light and accommodation, but slowly to convergence. Under oblique illumination, both anterior segments are seen to be normal. Vision: R., 20/100+1.

L., 20/100+2. Tension: R., normal. L., normal.

Ophthalmoscopic examination: Media clear. Both retinas abnormally transparent, the tenth, or pigmentary layer being transparent as well as the nine inner layers. Choroidal vessels even to the smaller branches easily observed. Retinal vessels of normal size.

Refraction: Manifest. R., +2.00 Cyl. axis 90, Vision=20/65. L., +2.00 Cyl., axis 90, Vision=20/65. Prescribed dark glasses and atropin sulphat 1% one drop in each eye three times a day for three days and once in the morning of the fourth day. On the fourth day retinoscopic examination yielded:

R. H. 6 at 90°; H., 10.50, 180°, L. H. +6.00, 90°; H. +9.00, 180°.

Deducting +1.00 Sph: R., +5.00 Sph. \ominus +3.50 Cyl., axis 90, Vision 20/50. L., +5.00 Sph., \ominus +3.00 Cyl., axis 90, Vision 20/50.

General Examination: Nose and throat: Large adenoids. Tonsils hypertrophied and slightly cryptic. Hearing 20/20, right and left. Examination by family physician shows heart, lungs and urine normal.

Diagnosis: Compound hyperopic

astigmatism with *aphyikia retinae*, following scarlet fever.

Treatment: The following correction was prescribed: R. +3.00 Sph., \ominus +3.50 Cyl., axis 90°. L. +3.00 Sph., \ominus +3.00 Cyl., axis 90°. We leave two dioptres of the hyperopia uncorrected on account of the child's age and for the reason that no glasses have previously been worn to any great extent.

Follow Up Record: April 15, 1918—Patient reports spectacles very comfortable. The vision is much better, and she is doing excellent school work. R., accepts no change of lens. Vision 20/30. L., accepts no change of lens. Vision 20/30.

Jan. 20, 1919: Though present correction has been very comfortable, there is slight headache after close work.

R., with +0.50 Sph., added to glass, Vision 20/30. L., with +0.50 Sph., added to glass. Vision 20/30.

DISCUSSION: Before her attack of scarlet fever, the patient was able to overcome by accommodation the high refractive error. After the attack, she could no longer do so. The wearing of spectacles not only corrects the optical error, but stimulates the formation of visual purple. Hence the continued improvement in vision.

It would seem that the abnormal visibility of the choroidal vessels is owing to a deficiency of retinal pigment. The pigment was probably absorbed as a result of the toxemia. There has been no absorption of pigment from the uvea, as is shown by the fact that the wall of the eye, under

transillumination, is little, if at all, abnormally transparent. A fairly careful search of the literature, including The American Encyclopedia of Ophthalmology, reveals the fact that no term has hitherto been invented to express the condition above referred to. We would therefore suggest that the words *aphyikia retinae* be employed as an exact designation. We have several times noted this condition after attacks of scarlet fever, but have seen no mention of it in the literature.

Just one word as to the formation of this term. *Apigmentia*, instead of *Aphykia*, suggested itself, but was at once rejected, because of hybridity. *Pigmentlessness* would be intolerably harsh. But *aphyikia* (*a*, privative; *phukos*, pigment [Giles's English-Greek Lexicon, ed. 1843, p. 875] and *ia*, condition,) is euphonic, nonhybrid, and formed by strict analogy with *aphakia*, or absence of the crystalline lens.

We deprecate the common but confusing practice of ophthalmologists who, whenever speaking of matters ophthalmoscopic, assign the pigment (outermost, or tenth) layer of the retina to the choroid. Thus, it is frequently said that "the retina is transparent," "the retina has lost its transparency," etc., and the choroid is continually spoken of as if it included the pigmentary layer of the retina. Such modes of expression, though convenient, lead to confusion of thought, and should be abandoned. When "the retina is transparent," it is only because the outermost layer of that structure, the pigmentary layer, has been absorbed.

PROLIFERATING ENDOPHLEBITIS AND RETINAL HEMORRHAGE

MICROSCOPIC EXAMINATION OF EXCISED GLOBE.

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This paper reports in detail the histologic changes found in an eye enucleated for absolute glaucoma, as these were brought out by different stains. A Thesis submitted for the degree Doctor of Ophthalmology in the University of Colorado, 1919.

Obstruction of the central retinal vein of the eye may be due to a number of conditions, among which are included thrombosis and proliferating endophlebitis. These two conditions may be jointly responsible, or either alone. In this paper I wish to report a case which apparently should be classed under the latter, with a possibility of thrombosis also playing a part.

Mr. R. L. S., age 71, a man with marked nephritis and high blood pressure, on August 23, 1918, discovered that vision of the right eye was considerably diminished. Within three days the eye was totally blind. Two days later when I first saw him, the fundus presented the classic ophthalmoscopic picture of thrombosis of the central vein. Seven days later he developed glaucoma, and eventually enucleation became necessary.

The eye was fixed in formalin and carried thru the usual laboratory technic altho unfortunately, sectioned longitudinally. My stains include: Hematoxylin and Eosin; Hematoxylin and Eosin-Aurantia and Orange G; Iron Hematoxylin, Hematoxylin and Van Gieson, and Phosphotungstic Acid Hematoxylin.

Altho I have not been able to prove conclusively a thrombosis of the central vein, the sections are sufficiently interesting to be worthy of study. All of them show *diffuse hemorrhage* in the retina; practically all of them have an obliteration of the canal of Schlemm on one side; and most of them show decided angiosclerosis. Some show an obliterating proliferative endarteritis-endophlebitis.

I am submitting with this a number of slides and a sketch of each, with the hope of demonstrating especially the vascular lesions. The sketches merely

outline some parts of the eye in order to suggest the location of other parts which are drawn in more detail and which are meant merely as a guide in finding the lesions described.

SLIDE 1: Fig. 1. (Colored plate.) In the retina are seen several blood vessels, one of which seems to be completely obliterated with proliferated endothelium. Leading from the adjacent vessel to this one appears to be a capillary which in a sense has canalized the proliferated mass of endothelium. The perivascular lymph spaces are conspicuous on two sides of the obstructing mass of endothelium. In the greatly thickened walls of the adjacent vessel are seen two capillaries which are running parallel with the vessel itself.

SLIDE 2: Fig. 2. Very much the same condition appears here that we have in slide 1. The vessel in the retina with the proliferated endothelium, however, is further away from the optic nerve and smaller.

SLIDE 3: Fig. 3. Just external to the vessels described in No. 1 is seen in this slide a vessel cut obliquely which is filled with proliferated or desquamated endothelium but not so compactly as in slides 1 and 2. In the center of the optic nerve is a congested blood vessel which shows beautifully the great amount of polymorphonuclear leukocytes.

SLIDE 4: Fig 4. Near the end of the optic nerve and outside of the sheath is a blood vessel which demonstrates beautifully the proliferated endothelium nearly filling the lumen, and which appears to have budded out from one side of the vessel wall alone.

SLIDE 5: External to the sheath of the optic nerve in the loose tissue are seen two small vessels completely oc-

cluded, apparently from an increase in the subendothelial tissue and the media. The elastic tissue is conspicuous. The endothelium is replaced by vacuoles which probably are fat droplets.

SLIDE 6: Fig. 5. This slide demonstrates very clearly the marked angiosclerosis. Several vessels near the optic nerve are almost occluded with a thickening apparently of all layers of the walls.

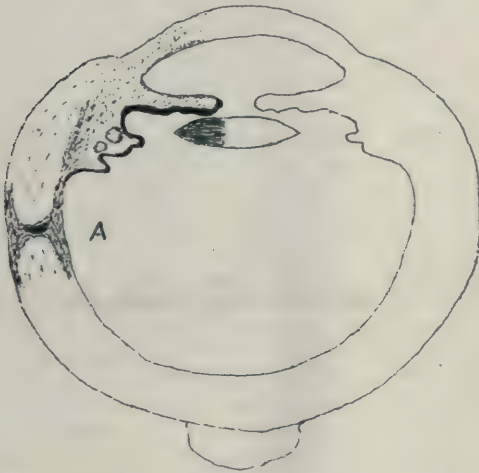


Fig. 7. Anteroposterior section of globe showing vena vorticiosa at A, which is also shown farther back in Fig. 4.

SLIDE 7: Here also is a beautiful lesion of obliterating arteriosclerosis—the vessel being located at the very end of the optic nerve.

SLIDE 8: A vessel near the optic nerve is completely obliterated with fibrous tissue running across the lumen.

SLIDE 9: Fig. 6. The lesion described in slide 8 is even more marked here—the bands of fibrous tissue spanning the lumen being more dense. These last two slides suggest strongly organized thrombi.

Fig. 7 represents the vena vorticiosa which is shown in slide 4. The walls

of the vessel seem to show some amyloid degeneration.

SLIDES 11, 12 and 13 show repetitions of lesions described above.

In many of these slides it will be noticed that the iris has been adherent to the lenticular capsule, and in retracting has left pigment attached to the latter. This is probably due to post mortem and fixation changes. In the congested blood vessels are seen many polymorphonuclear leukocytes which would suggest toxemia, if not septicemia. There is no perivascular infiltration to be found, and this would exclude lues.

It is remarkable to note how very well the rods and cones have been preserved in an apparently healthy state, in spite of other pathologic conditions of the eye. The disc has only moderate cupping, altho in nearly every slide the filtration angle on one side, at least, is completely blocked.

CONCLUSIONS: As a summary, I wish to emphasize the obliterating endarteritis-endophlebitis and the general angiosclerosis. Probably the same toxins which caused the nephritis are responsible here for the proliferation of endothelium and subendothelial tissue. These same toxins may have weakened the walls of the capillaries to the extent that slight obstruction to the venous circulation caused a rupture with the consequent hemorrhage. It is quite possible there was a thrombus in the central vein behind the point of division. It is also possible that having the eye sectioned longitudinally, a thrombus has been missed in the mounts.

With the clinical picture as it was, and considering these vascular lesions demonstrated, I am convinced the hemorrhagic retinitis was the result of a venous obstruction due to proliferative endophlebitis, thrombosis, or possibly to a combination of the two.

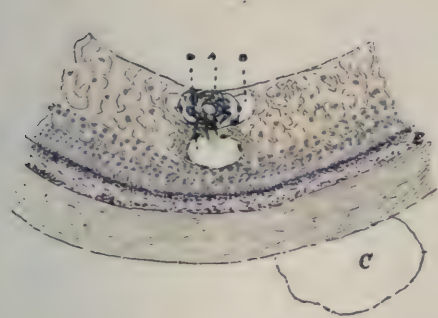


FIG. 1. A. PROLIFERATION OF ENDOTHELIUM IN BLOOD VESSEL. B. PERIVASCULAR LYMPH SPACE. C. OPTIC NERVE. D. BLOOD VESSEL. E. HEMORRHAGE.

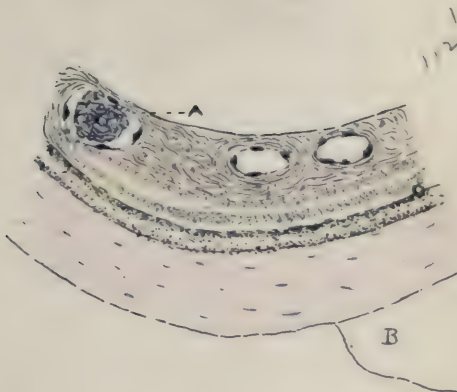


FIG. 2. A. PROLIFERATION OF ENDOTHELIUM. B. OPTIC NERVE. C. HEMORRHAGE.

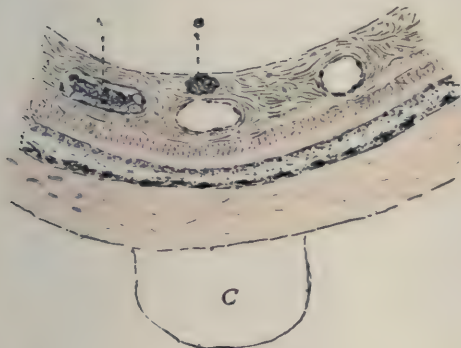


FIG. 3. A. PROBABLE OCCLUSION OF VESSEL BY ENDOTHELIUM. B. PROLIFERATION OF ENDOTHELIUM. C. OPTIC NERVE. D. HEMORRHAGE.

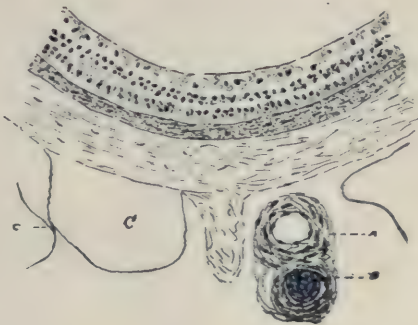


FIG. 4. A. SCLEROSED BLOOD VESSEL. B. VESSEL SHOWING PROLIFERATION OF ENDOTHELIUM. C. OPTIC NERVE.

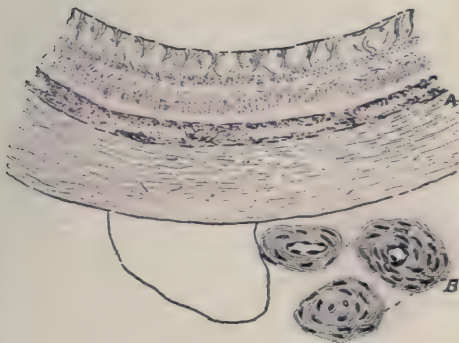


FIG. 5. A. HEMORRHAGE. B. MARKED ARTERIOSCLEROSIS.

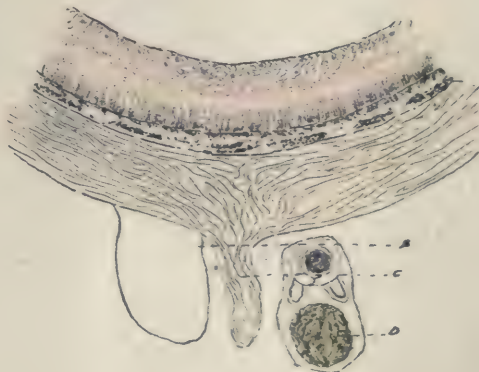


FIG. 6. A. HEMORRHAGE. B. OPTIC NERVE. C. NERVE SHEATH. D. PROBABLY ORGANIZED THROMBUS.

UNUSUALLY LARGE PRIMARY EPITHELIOMA OF THE OCULAR CONJUNCTIVA.

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This case report including the microscopic examination of the specimen suggests a possible papilloma which had undergone malignant degeneration. A bibliography of recent similar cases is given. The paper was read before the Pacific Coast Oto-Ophthalmological Society, San Francisco, August 4-6, 1919.

Primary epithelioma of the ocular conjunctiva is by no means so rare that every isolated case should be reported. It is exceedingly unusual, however, for such a growth to have progressed to the size of the one recorded in the following history, and it is believed also that the case presents some other points of interest. It is for these reasons that it is herewith reported for your consideration.

J. M. married male, aged fifty-six, presented himself at the office on February 19th 1919 for a consultation regarding what appeared to be a most extraordinary ocular condition as will be seen from the accompanying photograph.

The patient was a sturdy looking rancher in apparently good health excepting the ocular condition. He gave a history of a small redish spot having existed on the temporal portion of the sclera of the right eye since early boyhood. According to his statement and that of his daughter who accompanied him, this spot began to increase in size about three years prior to the consultation; and grew to such an extent that at the time of the examination the whole anterior portion of the eyeball was so covered that no cornea or sclera was recognizable. As seen from the accompanying photograph, the growth and eyeball to which it was attached appeared to be much larger than a good-sized English walnut and projected between the lids so that the latter could not be closed. Both upper and lower lids were everted and were constantly retained in this position, the whole anterior portion of the eyeball being completely covered by the growth which was of rough, crusty formation on the surface, probably due

to exposure and ulceration. No segment of the eyeball was visible. The growth measured one and three-eighths inches transversely by one and one-fourth inches vertically, above and be-



Fig. 1. Epithelioma of the conjunctiva. (Veasey.)

low which, when the lids were forcibly pried further open, a small sulcus could be seen from which the conjunctiva, apparently uninvolved, was reflected forward to the margin of the lids. There was considerable mucopurulent discharge, but the patient was not and had not been suffering any severe pain. No family history of growths could be elicited.

In the left eye there was an exceedingly small pupil, almost like an opium pupil, but the patient stated that he had been taking no medicine. The vision of the left eye was 6/12.

According to the patient, during the progress of the growth, from the time it had started until the time of

my examination, he had never consulted a physician regarding the same. He had been, and is at this time, living on a ranch not far from a small town where medical attendance could be obtained and only a few hours distant from many oculists.

The eyeball, together with the growth, was enucleated *en masse* under general anesthesia, with a considerable portion of the surrounding conjunctiva. The socket healed without complication, the eversion of the lids which was present at the time of the operation was disappearing as the tissues were contracting, but there was almost no sulcus below, as a large portion of the adjacent conjunctiva in this region had to be excised.

The specimen was sent to the Pathological Department of the University of Pennsylvania, and a report from Dr. Allen J. Smith, Professor of Pathology, is as follows:

"Sections of this eye show a fungating neoplasm, of fully 3 cm. in flat diameter and full thickness of over 14 mm., growing forward from the front of the eye, apparently covering in all, or a goodly part, of the cornea and the surrounding scleral part of the wall. It appears mainly as a papilloma springing from the subconjunctival tissue, sending forward a series of slender, branching fibrous outshoots, bearing capillaries and covered by thick envelopes of stratified squamous epithelial cells. These cells are characteristically large and columnar in shape in the depth of the envelope, close to the fibrous core, becoming flat and scale-like upon the surface of the growth. These constitute the great mass of the tumor. They do not become keratinized, do not show prickles, and do not arrange themselves in concentric nests or "pearly bodies" as commonly seen in skin growths of the same type. But that the growth is more than a conjunctival warty formation, one may be sure, aside from the massiveness of the neoplasm, by the fact that, about the borders at least, one can find distinct penetrating cords and groups of cells in the episcleral tissue below the conjunctiva proper. In

the fungus mass, in the midst of the thick epithelial covering of the papillomatous cores, here and there appear small foci of necrosis of the epithelium, with collection in such situations of excess of polynuclear leucocytes (tiny abscesses). Especially near the margin of the growth in the subconjunctival connective tissue are to be seen numbers of injected capillaries, the tissue is loose and there are focal and diffuse areas of lymphocytic infiltration, from a reactive inflammation; and some of these lymphocytes penetrate at places in lines into the sclera, although there is no evidence of complete perforation and no evidence that the epithelial cells enter the sclera. In this same situation appear a few penetrating masses, islets and lines of epithelium, indicating the essentially malignant character of the growth.

"Sections unfortunately are not favorable to detailed study of the internal structure of the eye. The sclera appears generally unusually thin and dense as if stretched. There is a small ciliary body area showing, which has the appearance of sclerotic changes. Iris and lens do not show in sections examined. Retina is detached and only small bits are included, these showing a slight lymphocytic diffuse infiltration, and the tissue looks loose as if from an edema. The optic nerve fails to show its sheath, but there is an excess of small round cells in its interfascicular septa indicating some degrees of chronic neuritis."

Diagnosis: Epithelioma of the conjunctiva.

The case is very peculiar from the fact that the condition was permitted to progress until it had reached the stage shown in the photograph before any attempt was made to secure medical attention.

As previously stated, epithelioma of the conjunctiva is by no means exceedingly rare, as many cases have been reported, but it is certainly somewhat unusual for the growth to have reached the size and condition described in the above case before any operative interference or treatment has been obtained. De Schweinitz and

Shumway reported such a case before the American Ophthalmological Society at its meeting in 1913, thoroly discussing the condition and reviewing the literature. According to them, primary carcinoma of the bulbar conjunctiva is less frequent than carcinoma of the eyelid which secondarily involves the eyeball.

A matter of the utmost practical importance, of course, clinically, is their method of invading the eyeball. According to some, the growths rarely penetrate the eyeball, and yet, on the other hand, competent authorities express an entirely opposite opinion. In the paper referred to above de Schweinitz and Shumway state that in fifty-three eyeballs, perforation occurred in twenty, or 37.6 per cent, and conclude that altho the cornea and sclera offer a considerable resistance to the growth of the tumor, especially if Bowman's membrane be intact, perforation does occur in a considerable proportion of cases, and especially if the growth has been present for some time. They also point out, however, that the percentage referred to above is relatively too high because the eyes examined were those in which the lesion had assumed such various proportions that enucleation was demanded. Growths that are situated at

or in the neighborhood of the corneal limbus it is stated are much more apt to penetrate the eyeball than if they occur at some distance from it—a point which is of considerable importance in determining what had best be done in any given case. Should the growth be situated at the limbus and very small, it is advised that deep excision may be practiced, provided the patient can be kept under observation for a long period of time. Growths situated at some distance from the limbus may be excised with less danger of the possibility of recurrence.

Involvement of the lymphatic glands in the neighborhood occasionally occurs, but is said to be exceedingly rare. According to Parsons, the pre-auricular glands are those first affected while involvement of the submaxillary glands usually occurs later, if at all.

The literature of epibulbar carcinoma prior to the year 1904 may be found in Saemisch's article on "Diseases of the Conjunctiva" in the second edition of the Graefe-Saemisch Handbuch des gesamten Augenheilkunde,¹ and from 1904 to 1910 in an article by Heilbrun in Graefe's Archiv f. Ophthalmologie², and from 1910 to 1913 in the paper by de Schweinitz and Shumway³.

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THE POSSIBILITIES OF MUSCLE OPERATIONS.

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This paper reports eight cases illustrating the results obtained by operations on the ocular muscles, if nonoperative treatment has been faithfully tried and a safe operation done on the right muscle. It was read before the Pacific Coast Oto-Ophthalmological Society, August 4-6, 1919.

The object of this paper is to remind those who may be interested, of the possibilities of muscle work, nonoperative as well as operative, and to illustrate by citing cases typical of each class of heterophoria. Squint cases are omitted as there is but little difference of opinion as to the proper treatment of such, and because the results are much less satisfactory than in the phorias where we expect functional improvement from accurate mechanical readjustment of the muscle balance.

The two cases of vertical deviation are from about 35 operations for such conditions. Contrary to accepted teachings on that point my best operative results have been in that class of deviations. This I feel sure is due to the safety of my shortening procedure and the almost complete absence of tenotomies. I seldom perform even a partial tenotomy of a vertical rectus and never a complete.

CASE 1. Hyper-cyclo-exophoria.

This was seen first May 1, 1908 in Manila.

MUSCLE BALANCE.—Exophoria 20; left hyperphoria 3; left plus cyclophoria 7.5. Refraction practically emmetropic.

Operation on June 1, 1908. This was done according to Todd's method but making the cuts so that the pull came from the lower end of the attachment of the left externus and in this way offer a chance of securing a triple correction. This was successful and continued so; for, somewhat over a year later, he measured absolute orthophoria in all directions.

Remarks. This case proves that a cyclophoria can be corrected by a Todd lengthening therefore it is fair to assume that one can be produced by it.

CASE 2. Hyper - cyclo - esophoria. Seen first Dec. 2, 1915.

Muscle Balance.—Esotropia 25 (left eye squinting); left hyperphoria 10; left plus cyclophoria 10.

Operation Dec. 11, 1915. This, in hopes of again securing a triple effect, consisted in one of my double hitch shortenings confined to the lower margin of the left externus. Test immediately after operation gave as follows: exophoria 1; left cataphoria 1; left plus cyclophoria 1. This for practical purposes was a full triple correction. He was seen last June 2, 1919 when he measured esophoria 4, left hyperphoria 2, no cyclophoria. His eyes were straight objectively and there were no subjective symptoms.

CASE 3. Cataphoria (left) with exophoria. Woman who had headaches for many years.

Refraction Right—plus S. 0.25 with plus cyl. 0.50 axis 100=20/20. Left—minus S 5.25 with plus cyl. 7.00 axis 85=20/50.

Muscle Balance.—Exophoria 12; left cataphoria 12; right hyperphoria 16; insufficiency of convergence, diplopia occurring at 12 inches. Rotations measured by tropometer showed defective, upward and also inward in the left eye, bearing out the noncomitant vertical deviation.

Operation Aug. 25, 1916, consisted in shortening of the left superior rectus. Sept. 11, she measured horizontal and vertical orthophoria, converged to six inches, and was able to read in comfort, headaches coming on only after prolonged near work. The permanency of this result cannot be told for she contracted pneumonia later that same winter with fatal result.

CASE 4. Esophoria.

A student who had been compelled to give up a course in law because of an esophoria which had resisted all the usual nonoperative procedures such as exercises, prisms. Headaches were severe and continuous. Refraction Right and Left plus S. 1.25 with plus cyl. 0.50 axis 90°.

Muscle balance after wearing a monocular patch measured esophoria 7, and the patient reported entire relief from eye trouble while wearing it.

Operation August 19, 1916, consisted in a shortening of his left externus. Relief was immediate so that he could read continuously without trouble. One year later he measured one degree esophoria but was free from symptoms. He now measures the one degree and relief has been permanent. In this case failure to obtain relief by ordinary methods changed this young man's entire future.

CASE 5. Exophoria.

An attorney who complains of severe headaches except in near work. Investigation of this proved that, for near, he allowed one eye to diverge, while for distance he used binocular vision and so had his troubles. He had had three muscle operations six years before consulting me which had given him great relief for a time.

Muscle Balance.—Exophoria right 7, left 12, noncomitancy probably being the result of the operations. Inward rotation weak in left eye.

Operations: First on Aug. 8, 1917. Left internus shortened. Resulted in reducing the deviation to 5 degrees at end of month. Not enough taken up. Second on Sept. 7, 1917. A Ziegler tenotomy of left externus correcting to orthophoria, but at end of healing measured the five degrees again, being what usually occurs in all partial tenotomies that do not actually lengthen the tendon. Third on October 1, 1917. An actual lengthening of the right externus. This gave a permanent correction to esophoria one-half degree, which he maintains to present time, and has been entirely comfortable in the use of his eyes at all distances.

CASE 6. Hyperphoria.

A young lady referred to me by a rhinologist, because of severe headaches, who had found nothing in the nose to account for them.

Muscle Balance.—Exophoria 8; left hyperphoria 7; right cataphoria 7; no cyclophoria. Convergence to 5 inches.

Operation Feb. 17, 1917, a shortening of the left inferior rectus. On Feb. 21 she tested lateral orthophoria and a left cataphoria of 1. Head felt much better. May 17, measured vertical orthophoria but the exophoria was back to the original amount. However, she is using her eyes with practically no discomfort even after prolonged near work.

CASE 7. Convergence insufficiency.

Unable to use eyes for near. Has had a number of abdominal operations to cure nausea and vomiting but without success.

Muscle Balance.—Exophoria 3.5 converges to 11 inches left eye diverging at this point; no cyclophoria; no vertical deviation; left inward rotation weak.

Operation May 12, 1916, shortening of left internus. July 19, 1916 tested orthophoria horizontal and vertical and converged to 3 inches. Has comfort in use of eyes for near. No more nausea.

CASE 8. Hidden hyperphoria.

A young lady who has had headaches as long as she can remember but becoming worse lately. Several changes in glasses with no relief. Referred to me for esophoria after an attack of dizziness with blurry vision.

Muscle Balance.—Esophoria 3; no vertical deviation and no cyclophoria. This on May 12, 1919. Refraction: Right—plus cyl. 0.25 axis 75°. Left—plane.

A patch was ordered on left eye with the idea of developing a latent esophoria in excess of the 3 degrees. By May 21st she measured exophoria 4.5; right hyperphoria 4; left cataphoria 4, and had entire relief from her symptoms while using the patch. Accordingly she was given glasses containing prisms 1.5 base down in right eye and up in left. One month later she reported entire relief from all symptoms even after prolonged near work. "Can not get

along without glasses." She had trouble the first week getting accustomed to the prisms.

This case has more than ever impressed me with the necessity of watching before making a positive diagnosis in heterophorias.

Finally I wish to emphasize the fact that *operations should not be done simply to change measurements but should be done to relieve symptoms*. Proper study of cases should enable one to determine whether or not the muscle imbalance is the cause of symptoms. Once

this is established nonoperative treatment should be instituted. If this fails to do good, the patient is at least entitled to know that a *safe operation* done on the *right muscle* will do no harm and in practically all cases will secure good results. The man who fails to give his patients this chance or who goes so far as to warn them against muscle operators is in my opinion not practicing his specialty fairly either to his patient, to himself or to those specialists who are trying seriously to relieve this class of cases.

REMOVAL OF FOREIGN BODIES FROM THE EYE.

FRANK ALLPORT, M. D., F. A. C. S.,

CHICAGO, ILL.

This paper discusses practical points with reference to the diagnosis and removal of foreign bodies lodged in the eyeball, using the publication of McReynolds' views as an occasion for the expression of his own.

In the September 13th Number of the A. M. A. Journal appears an article by Dr. John O. McReynolds of Dallas, Texas, on foreign bodies within the eyeball. McReynolds' review of the situation is excellent, and takes into consideration almost all ordinary aspects of this interesting and diversified subject. There are, however, some views expressed by Dr. McReynolds that it might be serviceable to discuss with him, and this is the purpose of this review.

DETECTION BY X-RAYS. McReynolds speaks of objects being so small as to be unnoticed by the X-ray. It would hardly be wise to positively challenge this statement, but the writer of this review believes he has never seen this opinion verified; altho his experience is somewhat extensive in this particular line of work, and he has removed steel particles from the vitreous so small as to be almost invisible to the naked eye. He has, of course, been deceived, as has probably every eye surgeon, in the X-ray findings; but it has probably never been on account of the size of the foreign body. It has been on account of a poor picture, or

an unfortunate head posture, concealing the object behind a piece of thick bone, or an inaccurate X-ray reading; but probably never, as has been said before, on account of the size of the object.

McReynolds refers to those puzzling cases where the missile has passed completely thru the eye, and lodged in the socket behind the globe. Of course, where it is positively ascertained by the X-ray, orbital measurement, and the localizer, that the object is in the orbital tissue, it can, unless excessive inflammatory conditions exist, be safely left pending future developments. But there are puzzling cases, where the object has just passed thru the posterior sclera and is entangled in the tissues immediately connected with the eyeball. In such instances it is often difficult to determine whether the object is inside or outside the scleral structure, which of course involves the question of operation. The writer has, in such doubtful cases sometimes, made use of what might be termed a moving picture—that is, he has had the patient move the eye two or three times during the

exposure, to ascertain whether the object moved with the eye or not, and if so the extent of the excursions. If movement was obtained, it indicated at least close proximity of the object to the eye and the wider the excursion the closer the proximity. Of course, this is not positive evidence, but it is, after all, evidence, and may assist in the decision of a doubtful case. Almost all cases can be decided by a careful examination of a good profile and a front view X-ray picture, assisted, where necessary, by exact localization.

McReynolds brings up the old question as to the tolerance of small particles within the substance of the lens. Doubtless the lens is quite tolerant of small objects for a while, but after a while lens tissue harboring a foreign body absorbs, and trouble is bound to ensue. After all, why should the object not be removed at once, and thus minimize the danger. The writer is quite certain that no ophthalmic surgeon of experience would allow a foreign body to remain in his lens, if he was confident it could be removed by a magnet, or a cataract operation, or both. Therefore, while it may be assumed that the lens tolerates a foreign body with some degree of patience, the writer feels that all intraocular objects, whether in the lens or elsewhere, should be removed immediately if possible. The longer such objects are allowed to remain, the more dangerous they become, whether, as McReynolds states, they are covered with plastic exudate or not. Any other policy is dangerous in the extreme, and should not be regarded as safe ophthalmic surgery.

NONMAGNETIC BODIES. Of course, when the removal of intraocular foreign bodies is referred to, we mean, in reality, magnetizable steel objects. All other fragments present difficult and almost impossible conditions. Such foreign bodies may include nonmagnetizable steel and iron, glass, copper, brass, wood, etc. If such objects are in the anterior chamber, or iris, they may usually be removed by forceps, an iridectomy (containing the foreign body) etc. If the object is in the lens,

the lens with the object may be removed by what becomes practically a cataract operation. But, if objects, uninfluenced by the magnet, are posterior to the lens then their removal becomes a very difficult and extrahazardous operation, and will not be referred to in this review. It is an entirely different subject.

The experience of the writer agrees with McReynolds when he speaks of the infrequency of actually observing glass within the eye. The writer can truthfully say that after many years of fairly extensive experience in traumatic ocular surgery he has never actually seen a piece of glass in the eye or conjunctival sac. He has had many cases referred to him, where the eye has been cut, and where the surgeon rendering immediate first aid has said that he has removed glass or some friend has removed glass, but he has never actually seen glass himself. The writer believes that actual glass injuries, especially severe ones, are very rare.

THE HAND MAGNET. The writer also agrees with McReynolds in his avowed preference for the Sweet hand magnet. He has never seen the Haab magnet remove steel where the Sweet magnet failed. He, therefore, regards the Sweet magnet as sufficient, and much easier handled. It becomes quite hot in a short time, however, and to offset this difficulty he covers the magnet with an overcoat of asbestos. Over this, of course, he slips a sterile bag about the shape of the magnet so that it can be safely handled. Of course, it may be possible that if a surgeon follows the directions of Haab and removes practically all fragments thru the cornea, the strong Haab magnet might be necessary to draw an object from the posterior portion of the vitreous chamber. But the writer removes all fragments, posterior to the lens, thru a scleral opening, and the Sweet magnet has proven sufficient for such work as well as in the removal of fragments in and anterior to the lens thru the cornea. The writer cannot understand why all surgeons do not adopt this rule, for it is cer-

tainly safer, better surgery and more logical, all things considered, to remove objects located posterior to the lens thru the sclera than to drag them out thru and over the sensitive and important structures located in the anterior portion of the eyeball. The writer has frequently and emphatically expressed his views on this subject and will, therefore, refrain from expatiating further, except to say that his continued experience has only emphasized his opinions.

Since commencing the use of the Sweet magnet the writer has modified his views concerning the intraocular introduction of magnet points. While he was under the influence of the large clumsy magnets, he became averse to introducing magnet points into the eye, owing to the unwieldy nature of the heavy cumbersome magnets. It seemed like too delicate work for such elephantine instruments. But the Sweet magnet is easily handled and if necessary, the smaller elongated points that come with the magnet may be attached, and carefully introduced inside the eyeball. The writer desires, however, to emphasize that, in his opinion, no point should be introduced inside the eyeball until all other methods have been first exhausted.

After the scleral incision has been made (which should be ample) the short strong point should be introduced into the opening, and as a rule the steel will promptly come out. The magnet should be held, if possible, directly on a line with the long axis of the splinter, as it, of course, comes out much easier this way. If the steel does not present, the point can be held for some time at the opening and the current frequently snapped on and off. If this does not suffice, the wound may be held open by two little demagnetized points that I devised years ago. They serve as minute retractors and are held by the two hands of an assistant and are preferable to the two sutures passed thru the two opposite sides of the incision, to hold apart the wound, as suggested by some writers. The magnet may now be replaced,

snapped on and off, etc. If this does not suffice, one of the small elongated Sweet points may be carefully introduced into the eyeball in the direction of the fragment as indicated by the X-ray picture. The writer believes it unwise to introduce magnet points of any kind inside the eyeball more than one, two, or three times, and not then if possible to avoid it. Each introduction means trauma and possible infection and this should always be remembered. The writer believes that delicate magnet points could be devised, that would be much less awkward to handle than scissors or forceps, but it should not be forgotten that the smaller and more delicate point the weaker will be the magnetizing power.

LOCALIZATION. Concerning the accurate localization of objects, as spoken of by Dr. McReynolds, the writer is convinced that less elaborate localization is usually sufficient for all practical purposes, altho there are occasional cases where more exact localization is highly desirable. He does not wish to be understand as opposing the important localization methods of Sweet and others, but he sincerely feels that if he has access to a clear full face X-ray view and a clear profile X-ray view that he can, in almost all cases, locate the object with sufficient accuracy for any operative procedure. This saves time, expense and trouble.

OPERATION. In discussing Dr. McReynolds' paper, Dr. Wm. M. Sweet, whose experience in magnet cases is, of course, very extensive, advocates the scleral route for the removal of steel fragments in almost all cases. He makes a cut in the conjunctiva and undermines it in all directions. He then holds the conjunctiva apart, by two sutures, one in each side of the incision, and opens the sclera. The writer prefers his own method, which consists in picking up the conjunctiva near the sclerocorneal margin and making a triangular flap with scissors up to the culdesac. This is undermined by expanding the scissors blades. The triangular flap can then be laid back and a large scleral area will be exposed.

A Graefe knife is then thrust thru the sclera just back of the ciliary region and extended backward to correspond with the size of the foreign body, remembering to make the incision too large rather than too small. After the object has been removed by the magnet the conjunctival flap can be placed in position and held there by two fine conjunctival sutures, placed one at each side of the apex of the flap—the apex itself being too close to the cornea to admit of suturing.

RESULTS. The writer wishes also to refer to Dr. Sweet's timely utterance concerning the ultimate result in many of these cases. They are frequently most disappointing and it often happens that, altho the steel is removed and the eye becomes quiet and vision is well restored, a few months hence the eye will become blind and

perhaps have to be removed. Still we frequently retain good eyes and good vision and we must not be discouraged because of occasional poor results. As Sweet remarks, the chief factor in securing success consists (aside from good operating), in early diagnosis, and in the prompt removal of the foreign body. This means the education of laborers and the employers of labor, for most delays originate with them. Back of all this, however, is "*Prevention.*" This means well lighted and well ventilated factories, fitted up with accident preventing machinery, goggles, etc. If such things are installed and used, a vast majority of these accidents will not occur, and if prompt and proper action is taken when they do occur, many eyes will be saved that otherwise will be lost.

OPHTHALMIC EDUCATION AND TEXT BOOKS.

CLARENCE LOEB, A.M.; M.D.

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This paper points out certain defects in educational methods, especially as bearing on the study of ophthalmology. It urges the advantage of becoming familiar with disease as symptoms rather than knowing it by names; and suggests a modification in text books that would help in this direction. It was read before the American Academy of Ophthalmology and Oto-Laryngology, October, 1919.

Several articles have appeared in the last few years dealing with the question of Ophthalmic Education. Various admirable suggestions have been made treating of more thoro instruction in the subject of ophthalmology, advocating more attention to it on the part of those responsible for the curricula of medical colleges, and, in general, emphasizing the importance of a knowledge of ophthalmology for a student intending to do general practice. These papers I do not desire to discuss, except to approve most heartily of anything that will improve medical education, and more especially ophthalmic education. But it does not seem to me that these improvements go far enough, or rather, it does not seem that they are attacking the prob-

lem from the correct angle. While they would result in improvement, might not greater progress be obtained if somewhat different methods of teaching were employed than those now in use? If we are traveling along a narrow and method-rutted path, is it better to patch up the old one or to survey a new one, if opportunity offers for such a course?

I realize that in advocating a change I am running counter to two great forces; that of the inertia which tends to crystallize methods, and that of the opinions of men of far greater experience in teaching than I have had, men who are honestly convinced that they are obtaining the best results with their present methods. But I submit that they may not be the best men to

observe the defects of the system; that the very fact of their long and successful experience may have brought about a routine that makes them unable to detect flaws that are palpable to one whose viewpoint is somewhat removed. I further submit that the fact that their students are able to pass a creditable examination both at the time of graduation and later before State Boards of Health is no evidence that they are qualified medical practitioners. It is simply proof that they knew the answers to the questions asked, with the presumption that they were equally well equipped to answer any other question, but is no criterion of their future ability in the actual practice of medicine. And I think this contention is supported by the fact that all schools advocate, and many require a year or more of hospital training. If the instruction these students have received in the schools is sufficient to prepare them for the practice of medicine, why is it advisable for them to spend a year or more in a hospital? Evidently, first, to enable them actually to perform or to assist in the performance of operations which they have witnessed or merely heard of as medical students, and secondly, to acquire proficiency in the diagnosis and treatment of medical cases. That is, the schools admit that the theoretic information which they impart must be supplemented by practical work, which their clinics, highly organized and well conducted as they are, do not furnish.

The charge that has always been brought against schools, in general, is that they are too theoretic; that they do not fit their graduates for everyday problems. I think it would be more correct to accuse them of not equipping their graduates to apply promptly and properly the information they have imparted. The student leaves his school with his brain crammed with valuable knowledge, but without idea of how to utilize it. He is like Kipling's ship before it found itself. His mental machinery functions, but there are slips, hesitation and stress instead of a perfectly coördinating whole.

In the Race of Life, we often see the honor graduate fall behind those whom he outranked in the school, and the cause for this, as I see it, is that the latter have learned better how to utilize the knowledge which they acquired. Other factors such as family connections, personality of the individual, and pure accident of course enter into the problem, but I think the former reason will be found most frequently to account for the success of some and the failure of others. What is true of schools in general is true of medical schools in particular. Knowledge alone does not make an instructor; he must have the ability to impart it. Knowledge alone does not make a successful physician; he must have the ability to utilize it. Theoretic acquaintance with a dozen different methods of operating for strabismus is far less valuable to the individual than a time-tried experience with one.

In developing my thesis, I have been, and shall be compelled to refer to medical education in general, for ophthalmic and oto-laryngologic education differs not in character from general medical education, but only in the special methods applicable to the subject, as for example, instruction in the use of the ophthalmoscope instead of the laryngoscope or the stethoscope. Therefore, if what is said of ophthalmic education is true, it is likewise true of oto-laryngologic and general medicinal education, and vice versa.

Medical education is a combination of didactic and clinical instruction: that is to say, the instructor either describes a condition such as cataract, otitis media, typhoid fever, etc., or he demonstrates a case, analyzing its features. I am referring only to the method of teaching the recognition of diseases, that is to say diagnosis.

Of the two methods of teaching, I venture to say that the majority of students prefer clinical instruction, because the case is there before them, and knowledge acquired thru the sense of hearing is supplemented by that acquired thru the senses of sight and touch. The mental picture thus formed is distinct and lasting—sometimes. So

true is this that after a demonstration in the clinic, the student can usually describe the disease as it appeared to him.

But now a curious phenomenon takes place. If a little time is allowed to elapse, so that this image becomes somewhat blurred, and then a similar case is placed before the same student, he will frequently, if not usually, be unable to diagnose it. But if then told that it is a case of cataract, for example, he will proceed to describe it with all of its symptoms. The reason for this, which all instructors have witnessed, is the faulty method of instruction and not the lack of ability of the instructor or the lack of receptiveness of the student. The latter is taught diseases by *name* and not by *symptoms*. His mind focuses upon the fact that cataract, otitis media, typhoid fever or whatever the case may be is a disease characterized by a certain group of symptoms, and slurs over the fact that what actually occurs is that a group of symptoms such as diminution of sight, absence of the fundal reflex, white mass in the pupillary area, etc., makes up the clinical picture of a disease to which we give the name of *cataract*. He may know that these symptoms are present, but he cannot fuse them into a clinical entity, while he is quite capable of analyzing cataract into its symptomatology. In terms of a homely illustration, he puts the cart before the horse, or to use an illustration from our own specialty, he is looking at the image instead of the object.

It might be called hairsplitting to make a distinction between saying that cataract is a disease characterized by a certain group of symptoms, and saying that a certain group of symptoms make up the clinical entity called cataract, but there is a distinct psychologic difference between the two statements. In the former the mental attitude is analytic; in the latter it is synthetic.

If a recent graduate, especially one who is preparing for a State Board examination, is told to examine a case of typhoid fever, for example, he will probably demonstrate all of the symptoms present, or at least most of them, because he has been taught that in

typhoid fever certain symptoms are found, and he will know what to look for. But if the same man is given an unnamed case to diagnose, he will hesitate, probably find a couple of symptoms, but will be unable to combine what he has found into a clinical entity, or to search for additional symptoms, because he has not been taught how to do this. If he makes a correct diagnosis, it will usually be a lucky guess. As I said, he knows diseases by names, not by symptoms.

Now, when this student enters into the practice of medicine, either in private practice or as an interne in a hospital, it is the opposite condition which confronts him. The disease comes to him without a name, or if named by the patient, frequently if not usually incorrectly named. The history may or may not be helpful or reliable. He must synthesize instead of analyze, and is handicapped by his inability to reverse his mental pictures. In a hospital, his senior or visiting man can assist him, but "on his own," he has a difficult task even in the conditions easiest to diagnose. He guesses a name of a disease, and then tries to fit the symptoms of the disease he has in mind to the disease he has in front of him. If he fails, he guesses another one, and so on until success crowns his efforts. How much better equipped he would be, and how much easier his task would be if he had been taught first to look for symptoms, second to look for symptoms, and then again to look for symptoms and only when all had been found to combine them into an entity. This he must do sooner or later if he wishes to become a successful practitioner, and how much better it would be for him to learn it in the school, where the responsibility for the patient is on the shoulders of some one else!

The members of this association are physicians of recognized ability, many of them instructors of wide repute, who have been engaged in the practice of our specialties for periods of varying lengths. It can be well assumed that their experiences have been those of a majority of oculists and oto-laryngologists, and that their

opinions will correctly reflect that of our profession as a whole. As men whose first interest is the advancement of our specialties, let me ask the oculists how many of you could immediately and unhesitatingly give all of the symptoms of acute iritis, for example? Probably all. Well and good. Now let me ask another question. Let me pick out one of the symptoms of acute iritis, say circumcorneal injection, and ask how many could as unhesitatingly name all of the diseases in which this symptom appears? I do not mean the diseases in which this symptom appears as one of the cardinal symptoms, as for example acute glaucoma, but the diseases in which this symptom is found, no matter what its importance may be, because we must remember that symptoms do not come to us labeled cardinal or insignificant. Their relative importance is learned only by years of constant study and repeated experiences. I frankly confess that I could not name off-hand more than half a dozen or so, say iritis, iridocyclitis, interstitial keratitis, corneal ulcer, glaucoma, phlyctenular keratitis, and perhaps a couple more. But upon thinking the question over, I find it is present at some time in the following diseases, in addition to those already mentioned—foreign body on the cornea, superficial punctate keratitis, keratitis profunda, descemetitis, staphyloma of the cornea, episcleritis, scleritis, staphyloma of the sclera, burn of the cornea, abrasion of the cornea, wound of the cornea, wound of the sclera, rupture of the sclera, tumor of the iris, iridodialysis, traumatic coloboma of the iris, traumatic aniridia, panophthalmitis, sympathetic ophthalmia and traumatic cataract, and then I am not sure I have named all. Then there are other lesions where this symptom is present as the result of some complicating condition, such as sarcoma of the choroid as the result of a status glaucomatosus, and foreign body in the eye, for the same reason or because of a complicating panophthalmitis.

Now, in order to make a diagnosis of a case that presents the symptom

of circumcorneal injection, the oculist must be able to recall almost instantly at least a large part of the above diseases, and if this is sometimes difficult for men who have been in practice for a dozen or more years, and have met these diseases more or less frequently during that time, how much more difficult it must be for a beginner, who has not learned from experience which can be instantly excluded on account of the absence of other equally important symptoms!

It might with justice be asked "How can a doctor have all of these diseases in his mind? Isn't that what text-books are for?" To this I would reply that if our ophthalmic training had been along the proper lines, such a task would be no more difficult than to remember an equal number of symptoms of any one disease. But the student is not taught thus. He is taught to remember symptoms from the names of diseases. No, that statement is not strictly true. He is taught that a certain disease is recognized from the presence of a certain group of symptoms, whereas he should be taught that a certain symptom may indicate the presence of any one of perhaps several diseases, whose further diagnosis must be made by means of the recognition of other symptoms, each of which in turn may be present in more than one disease. Pathognomonic symptoms are rare indeed. By a process of exclusion of diseases in which one or more of the symptoms present are not found, the diagnosis may be made.

As a matter of fact, is that not the way that the experienced physician makes his diagnoses, whether consciously or not? He groups the different symptoms present into a mental picture which recalls a symptom complex which he knows as a certain disease. In doing so, he has mentally excluded disease after disease which one or more of the symptoms present has called up, but which does not correspond to the entity of all of the symptoms. But the point which I wish to emphasize is that he has learned to

do this not in the School of Medicine, but in the School of Experience.

Now as to text-books! A text-book of ophthalmology, in general, consists of a series of descriptions of diseases grouped according to the particular part of the eye which they chiefly or exclusively involve. For instance, a chapter will be devoted to diseases of the iris, altho there is certainly no clinical or pathologico-anatomic resemblance between an iritis, a sarcoma of the iris and a coloboma of the iris. Their only point of relationship is the fact that each primarily affects the iris. There is more danger of diagnosing an iritis as glaucoma than as coloboma of the iris, and it would seem more logical and certainly easier for the student to bracket the former together for purposes of comparison and differentiation. But this is a minor point. Some form of division must be followed, and no doubt equally weighty objections could be urged against any other method.

The description of each disease is more or less roughly divided into five parts: (1) Definition of the disease, (2) etiology, (3) symptomatology, (4) pathologic anatomy, and (5) therapeutics. In addition, there may be a description of the normal anatomy and physiology of the tissue affected, either at the same place or elsewhere in the book. Furthermore, there is a more or less lengthy discussion of refraction and the principles of physiologic optics. The value of the book is directly dependent on the correctness of its statements, the amount of information it contains, and the accessibility of the latter. For mere size is no criterion of value, if the information is so scattered and voluminous as not to be readily comprehended. Now, there is no question that text-books so written are of great value, whether they are small ones for use of students or encyclopedias for more extensive investigation. The objection which I have to urge against all of them is that to make use of them one must know beforehand what disease he wishes to study. If we have a case which we know is glaucoma simplex, for exam-

ple, and we wish to supplement our knowledge of this disease, they serve the purpose admirably. But if we have a patient complaining of a loss of vision, and we wish to find out what is the matter with him, we can read up on atrophy of the optic nerve, the various forms of neuritis optica, retinitis etc., that is those diseases whose *names* we can recall, but when we have finished with that list we are at a loss. There is no text-book which we can consult that is arranged to show in what diseases loss of vision occurs. It is true that each book has an index to which we can refer. Let us take up one of the best and most popular of the larger text-books and turn to the heading "Vision." We find there are references to "dimness of vision," "loss of vision," and "obscurity of vision," all having the same page number. We find that it refers to amblyopia, amaurosis, and disturbances of vision without ophthalmoscopic changes. The chapter describes well those conditions of which it treats, but it is not what we want: that is to say, it does not give a list of diseases, one of whose symptoms is decrease in sight. What can we do? We can either search thru the book for other diseases causing loss of vision, or we can ask for a consultation with some one who may remember some other disease and thus assist us in arriving at a diagnosis.

Let us be frank! We have all made mistakes in diagnosis, or if we will not confess that, we will admit that we have had cases in which other men, our equal if not our superior in ability, have made mistakes. If you will recall such cases, you will find that the cause of your colleague's failure and your own success was usually that he did not recognize the importance of some symptom. It did not fit in the mental picture he had formed of the disease, and he had dismissed it as atypical or unimportant. You, on the contrary, remembered that it occurred in another disease, which was portrayed equally well by the group of symptoms present, and therefore you were able to make the correct diagnosis. If the

text-books of your colleague had been arranged so that he could have seen at a glance the names of the diseases in which this neglected symptom appeared, he would have been able to make the diagnosis as well as you, because he could have read the descriptions of the various diseases until he found the one which fitted the symptom complex present.

It seems to me that text-books will be incomplete until they consist of two parts, each equally valuable. If I lay more stress on the one than on the other it is because it has been neglected. The first part should describe symptoms and explain their significance, that is, should state in what diseases they are found and what they indicate. For example, by decrease of vision we mean the inability of the

patient to read the 6 meter line of the test card at 6 meters distance. Among other diseases it is found in senile cataract, and is caused by the interference of the opaque lens with the passage of rays of light to the retina. The second part of the text-book should consist of the present text-book with all of the information at our command, arranged in a manner that will permit it to be readily grasped and utilized. The present text-books are complete so far as they go, but to consult them, one must have an idea of what he wishes to look up. They are like a dictionary, valuable for one who wishes to look up the meaning of a word, e. g. nystagmus, but of no use to a man who sees certain movements of the eyeball and has forgotten their name.

NOTES, CASES AND INSTRUMENTS

KERATOCONUS CONSECUTIVE TO VERNAL CONJUNCTIVITIS.

DR. JOSÉ DE J. GONZALEZ.

LEÓN. GUANAJUATO, MEXICO.

When one is fortunate enough to be the first to make an observation, on publishing it, one feels somewhat afraid of being in error, perhaps not having properly appreciated all the circumstances pertaining to the causation of the fact, or by giving too much importance to a determinate incident.

We felt like that, after having read before the Mexican Ophthalmological Association our first observations of ametropias developed as a sequel of vernal conjunctivitis (see A. J. O. v. 2, p. 233); and even more so, after we claimed that the development of keratoconus, that has such an obscure etiology, was also due to the vernal conjunctivitis, because, how was it possible that nobody else had observed these complications of spring conjunctivitis?

The new cases seen by us every year, of ametropia usually with myopic astigmatism, more or less irregular, in patients that have been under observation for several years, on account of vernal conjunctivitis, have finally given me the absolute certainty that such refractive errors are really caused by the conjunctival disease; as they did not exist in the early stages of it. If no one before had made that observation, it was not due to carelessness, nor lack of sagacity, but because we are placed in very favorable conditions, being in the middle of a very extended region, and the only eye specialist in many scores of miles around, makes it easy to see these patients during consecutive years.

I now have the opportunity to publish a second observation of keratoconus and astigmatism with vernal conjunctivitis. It refers to the same young girl I referred to in a former paper (V Mexican Medical Congress). I did not mention then any corneal

complication because at that time there was not any, giving thus a notable certainty to the fact that keratoconus has arisen as a complication of vernal catarrh. Our new observation follows:

A girl of 10 years, living at Lagos de Moreno, State of Jalisco, a place of temperate climate, has been treated since she was five years old, for vernal conjunctivitis limited to the bulbar conjunctivae. There was gelatinous infiltration, of grayish color, well raised near the cornea and surrounding it. Gross vegetations at both ends of the horizontal diameter of the cornea, with few vessels, strong itching and no secretion. The exacerbations begin in the spring, and reach their full strength in the months of July, August and September, about the time I see her every year. In 1918 the recrudescence was very intense, and she had to stay in this city for a longer period than in previous years. She was treated by vaporizations, Verges ointment, cocain and adrenalin, and one radium exposure that provoked intense reaction, but helped very much to reduce the symptoms. Vision was found to be normal, when she was examined as a routine procedure. The patient was emmetropic.

This year, the little patient did not have an exacerbation of the catarrh, but had to be brought to us, on account of rapidly failing vision, and we were surprised to find: O. D. V.=1/10. O. S. V.=1/50.

Refraction, that was emmetropic last year, was now as follows: R. irregular astigmatism, the more myopic meridian being -4 D., and the less myopic -3 D. The left eye shows a myopic astigmatism very high and very hard to determine, on account of its irregularity. The more myopic meridian is -15 , and the less myopic is -13 D.

The form of the cornea in the right eye is spherical, and in the left eye is conical and pellucid. Placido's disc reflects upon the right cornea in concentric circles, and from the left cornea

the circles become triangular with sinuous sides. It is therefore a keratoconus.

All traces of spring catarrh have disappeared so much so that any ophthalmologist seeing the child for the first time, would not know to what cause to ascribe the myopic irregular astigmatism of the right eye, nor the conical cornea in the left.

Is it possible that the astigmatism in the right eye is only an early symptom of a coming keratoconus in that eye also? Time alone can decide this question. But the keratoconus in the left eye developed in a short time, from December, 1918, to August, 1919. To correct it we have ordered glasses, and instillations of pilocarpin with a compressive bandage. R—4. Sph. \subset —1 cyl. Axis 90°. L —8 D. Sph.

I again insist that the prognosis of spring conjunctivitis is always darkened by astigmatism (irregular) or keratoconus, complications which are very serious occurring in youth. Therefore it is important to cure the vernal catarrh as soon as possible in order to avoid the danger of ametropias and corneal deformities. The ophthalmologist should not hopefully wait for the disease to disappear, as we have evidences that the circumcorneal vegetations really exert some dangerous influence upon the nutrition of the cornea, diminishing its resistance and allowing to some degree its becoming deformed and even conical.

FIVE CILIA IN THE ANTERIOR CHAMBER.

ALBERT E. BULSON, JR., M.D., F.A.C.S.
FORT WAYNE, INDIANA.

According to Würdemann's Text-book on Injuries of the Eye, which perhaps is the most comprehensive work on the subject, cilia in the anterior chamber following accident or operation are rare; and they generally are tolerated for years without causing the least symptoms, though they may give rise to irritation, ciliary injection, photophobia, lacrimation, pain, or to the development of epidermal tumors

of the iris, cysts, with subsequent glaucoma, blindness, or loss of the eye.

He quotes Vieweger as having collected twenty-nine cases from the literature, in several of which a number of hairs (in one case 14 cilia) were found. In these cases the hairs enter thru a perforating wound of the cornea, usually at the limbus, and are there seen floating freely in the aqueous or with one end impacted in the wound or its resulting cicatrix. These hairs may be retained for a long time without causing irritation. Müller (Wien. med. Woch. No. 13, 1894) reports one in the anterior chamber for twenty-four years.

Two cases of sympathetic inflammation have been reported from cilia impacted in the anterior chamber—one by Cuvier and the other by von Graefe. Würdemann reports two cases, in which cysts of the iris formed; and he says that as cilia are apt from irritation to give rise to cysts of the iris, they should be removed by corneal incision and extraction by the forceps. From the literature that is available it is evident that cases are comparatively rare, and cases in which more than one cilium is found in the anterior chamber are rarer still. Accordingly, I have felt that a report of the following case may be interesting.

The patient, Mr. G. H., aged 33, an employe of the Berghoff Brewing Company, was first seen on January 3, 1917, following an injury to the left eye by the rebounding of a stiff piece of wire which he was cutting. The patient stated that the vision was completely lost immediately following the injury.

Examination disclosed a triangular wound in the cornea, about five or six millimeters in length, to the inner side of the visual center. There was no prolapse of iris, but the anterior chamber was so full of clotted blood that determination of the extent of the injury to the intraocular structures was not possible. An X-ray examination disclosed no foreign body, and the patient was placed upon an expectant plan of treatment. The blood in the anterior chamber was absorbed slowly, but the

eye continued to be irritable and painful.

On January 15, or nearly two weeks after the injury, the blood and exudate in the anterior chamber had absorbed sufficiently to show some dark streaks across the pupillary area which by examination with the loupe were thought to be cilia, tho the number seemed to discredit that assumption. As the eye was improving slowly the expectant plan of treatment was continued; but on February 3 (exactly one month after the injury) the anterior chamber was sufficiently clear to make certain a diagnosis of five eyelashes, lying across the pupil and resting upon the anterior capsule of the lens and partly upon the lower pupillary margin of the iris.

The patient was advised to have the eyelashes removed, but owing to his desire to have his employers provide him with compensation while off duty, as well as to pay any expenses incident to his operation, and a controversy between the employers and the liability insurance company concerning liability for this compensation, the matter was given no attention until May 2, or four months after the injury, when the patient was brought in for operation, and with a report that the eye had continued to be irritable, with more or less lachrimation and photophobia. At that time the vision was 5/200, the impairment of vision being due to the corneal scar and a very slight cloudiness of the lens, the latter probably being caused in a measure by the irritation produced by the eyelashes which were partly lying upon the anterior capsule.

Under cocain anesthesia a small incision was made at the limbus, and with a pair of Liebrecht's iris forceps five, apparently full length, cilia were removed intact from the anterior chamber, one by one. No undue reaction followed this operation, and the patient not only made an uneventful recovery, but the irritation, with attending photophobia and lachrimation which had existed for weeks, disappeared; and at the last examination the vision was 5/200, or about as good as could

be expected in view of the scar tissue and slight cloudiness of the lens. The eye has remained quite up to the present writing, and there has been no development of a cyst or epidermal tumor of the iris, which according to the literature on the subject seems to be one of the possibilities.

UNILATERAL PROGRESSIVE MYOPIA.

ADOLPH O. PFINGST, M.D., F.A.C.S.

LOUISVILLE, KY.

This case, reported before the Louisville Eye and Ear Society, December 11th, 1919, seems to be rather an unusual one.

Mrs. A., age 30 years, a housekeeper with a good personal and family history, was first seen by me in December, 1903, when she was 15 years old. She was attending high school at the time and complained of burning of her eyes after reading for a short time, blurring of type and an occasional headache. Shadow test at this time showed 1.0 D. hyperopia in the horizontal meridian, and 0.5 D. h. in the vertical. The interior of both eyes was normal. In the subjective test, made with the patient fully under the influence of a cycloplegic, she accepted with the right eye $+0.75$ D. cylinder, axis $105^\circ \subset +0.25$ D. S., which gave her 20/15 vision. With the left, $+0.5$ D. cylinder, axis $75^\circ \subset +0.5$ D. S. vision 20/15. She was given glasses correcting her astigmatism, to be used constantly, with complete relief of the asthenopia.

Three years later she consulted me on account of phlyctenular disease. After recovery from this I found upon casual examination that with her old lenses, which were still comfortable, her vision in both eyes was 20/15—. She was then 18 years old, was living at home assisting her mother in her household duties, and doing but little reading.

I did not see her again until April, 1915. She then gave the interesting history of a gradual impairment of vision in the right eye until it had

become practically useless. Coincident with the impaired vision the eye had gradually turned outward until there had developed a decided divergent squint. At this time the shadow test revealed between $5\frac{1}{2}$ and 6 D. myopia in this eye. A good sized crescent had formed on the temporal side of the optic disc and the macular region was mottled with numerous areas of atrophy and small pigmentary deposits. There was considerable deviation of the visual line outward, and slight exophthalmus. There was no asymmetry of the cranium. With the left eye covered the best vision obtainable in the right eye was 20/200, this with a -6 D. Lens. The corneal curve was unchanged, measuring less than 1 D astigmatism with the ophthalmometer. The lens was evidently in its normal position, and the anterior chamber was of equal depth in every meridian. Tension was apparently normal and alike in both eyes. The left eye showed no change in refraction or otherwise from that originally recorded.

My last examination of this case was made in September, 1919. The shadow showed an increase of 2.0 D. myopia and with a -8.50 D. she had 20/200 vision. In addition to the degenerative changes in the retina noted in 1915

there were several larger atrophic areas near the macula. Quite a large staphyloma had developed. The left eye was still unchanged.

This is a case of acquired anisometropia, the condition of the right eye being one of progressive or malignant myopia due, no doubt, to elongation of the axis of the eye. The possibility of the myopia being due to changes in the conformation of the cornea (keratoconus) or the lens (result of subluxation) could positively be excluded. The cornea had its normal curve, while the equality of depth of the anterior chamber and failure to see the lens edge thru a wide pupil would exclude the possibility of a subluxation of the lens. The anisometropia in this case developed after the 18th year; perhaps after the twentieth; later than is usual for progressive myopia to develop. These cases usually begin between the 12th and 15th years of life.

The development of progressive myopia in one eye while the other remained unchanged in its refraction during a period of sixteen years, is an unusual occurrence. A similar case has never come under my observation nor have I been able to find such recorded in the literature at my disposal. I am unable to offer a reason for its development.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

COLORADO OPHTHALMOLOGICAL SOCIETY.

November 15, 1919.

W. A. SEDWICK presiding.

Vernal Conjunctivitis.

J. M. SHIELDS, Denver, presented for MELVILLE BLACK, Denver, a boy of 11 years, resident in Colorado, who was suffering from typical vernal conjunctivitis; altho after the diagnosis had been correctly made by Dr. Herri-

man of Alamosa the parents had taken the child to another surgeon, who had been treating the case as one of trachoma. The ocular conjunctiva was somewhat red, the eyelashes glued together with secretion, and the eyes watery, and in a strong light there was marked photophobia. When the lids were everted they were found to be somewhat pale, and the upper one thickly studded with roundish elevations—the so-called cobblestone ap-

pearance. Rubbing the lids together brought out a whitish, tenacious secretion, which had been examined by Dr. W. C. Finnoff, Denver (see below). It was proposed to treat the case with tubes of radium emanation.

DISCUSSION.—W. C. Finnoff, Denver, said he had made smears in the ordinary way from the right eye, and found no eosinophiles. But in smears obtained by rubbing the inside of the left eyelid vigorously with cotton a few eosinophiles were found. They were more numerous than would be found in the normal eye.

J. W. Patterson, Colorado Springs, mentioned a case which he had seen a year previously, in which the boy became very much more comfortable after having the vegetations trimmed off and being given a refractive correction in tinted lenses.

Edward Jackson, Denver, had seen this summer the case which he had treated with radium about a year previously, the last treatment having been in January, 1919. Altho it was not possible to get as much radium as was desired until the last two applications, the patient was recently found to be very much better than he had ever been before (the disease having lasted for many years) but there were still some granules at the ends of the lids. The dose used was 30 to 45 millicuries for fifteen minutes. The tube was wrapped in a couple of thicknesses of lead foil and held in contact with the everted lid for fifteen minutes. Four treatments in all were given. The Colorado Radium Company was now prepared to sell or rent radium emanation in tubes.

Traumatic Staphyloma of the Sclera.

H. R. STILWELL, Denver, again presented the patient shown to this society in December, 1918, on account of traumatic staphyloma of the sclera due to a fall; and referred to in the proceedings of the Colorado Ophthalmological Society as printed in the February, 1919, issue of the *AMERICAN JOURNAL OF OPHTHALMOLOGY*, page 153. The eye had not become soft. The region of the staphyloma (into

which the iris had been displaced and with which it had become incorporated) was whiter than formerly, and the cataractous lens was more opaque than formerly. There was no discomfort.

DISCUSSION.—J. R. Robinson, Colorado Springs, mentioned that about a year previously he had seen a patient who had suffered a somewhat similar accident, falling with his whole weight upon a drill. About the upper third of the sclera was completely ruptured, a good deal of vitreous was lost, and the eye had to be enucleated.

F. R. Spencer, Boulder, asked whether the case would be improved by cauterization of the bulging sclera with a flat cautery electrode. He did not propose to go right thru the sclera.

G. F. Libby, Denver, suggested that whenever the patient was willing, the cataractous lens should be extracted thru an incision made from below.

Edward Jackson, Denver, would hesitate very much to employ cauterization of such a lesion. On account of the apparent involvement of the iris in the bulging; he believed that there would be danger of opening up channels of infection even with the cautery. It might be the needling would take care of the cataract, the lens apparently having already been partly absorbed.

C. E. Walker, Denver, would be reluctant to interfere in this case, there being a risk of inflammation of the uvea, possibly of a septic character. He had never had much benefit from needling after the age of thirty or so, absorption being so very slow.

Syphilitic Neuroretinitis.

J. A. McCaw, Denver, again presented a woman of 29 years, who had been shown to the society three years previously on account of a syphilitic neuroretinitis. At that time her vision was reduced to R. 15/60, L. 15/80, and there was a right hyperphoria of about 14 centrads, with macropsia in the left eye and photopsias. At the time of the previous demonstration, examination of the fundus of the right eye showed vascular changes especially in

the lower temporal vein, and of the left eye a central choroiditis, with a heaping up of a pearl white exudate immediately below the macula. Mercury by inunction, combined with potassium iodid, had brought the vision of the right eye up 15/30, and that of the left eye to 15/15. The vision had remained the same until about two months ago, when she returned complaining that the upper part of the field of the left eye was dark. The field of this eye showed a defect in the upper half, greater on the nasal than on the temporal side. On one of the lower arteries of this eye was an aneurysmal dilatation of the vessel wall. The right eye showed a retinitis proliferans, and all the vessels in both eyes were greatly enlarged and very tortuous.

DISCUSSION.—Edward Jackson, Denver. This ophthalmoscopic picture is certainly one of extreme interest, and all the more because of the history which we have of the case. The appearance is as much like that of retinal angiomas as one can conceive, except that we have not the large clusters of blood vessels. There is marked dilatation of one vein, and enormous dilatation and extreme tortuosity of some of the vessels in the lower part of the fundus. Some of these vessels are as much as twelve diopters hyperopic. To my mind the retina has been greatly thickened here, and to me this is an evidence of syphilitic disease of the retina in a form not often seen. Angiomas is not very well understood, but the histories of a number of cases have been carefully investigated without eliciting evidence of syphilis.

J. A. McCaw (closing). There is one question about the treatment, whether to give her neoarsphenamin or not. If the Wassermann test is positive now I think it will be all right to use arsphenamin in this case, altho many men doubt whether arsphenamin is as useful in a late case of this character as in the earlier stages of the disease.

Panophthalmitis from Penetrating Injury.

E. E. McKEOWN, Denver, presented

a boy whose eye had been penetrated by a pen-knife held in the hand of a schoolmate. The knife had passed through the sclera in the ciliary region. Suppuration had rapidly developed in the vitreous, and at the time of demonstration, several weeks after the injury, the pus showed as a yellowish mass behind the lens, and bulging in the wound. The parents objected to the idea of enucleation and the patient was shown for an expression of opinion. The boy had been kept home from school for a week on account of nausea and vomiting, and had for a while been under the care of a physician who told the parents that it was unnecessary to see an ophthalmologist, as the eye would become all right. When first seen by Dr. McKeown, five or six days previously, the lids were very closely matted together with pus. A culture from the pus which discharged from the eye had been found to contain almost a pure growth of staphylococci.

DISCUSSION.—W. H. Crisp, Denver, while feeling that the eye would have to come out, believed that there was practically no risk of sympathetic involvement of the other eye.

H. R. Stilwill, E. T. Boyd, and C. E. Walker, Denver, expressed themselves as strongly of the opinion that the eye should be removed without delay.

Plastic Cure of Symblepharon.

W. C. FINNOFF, Denver, presented a man of 26 years who in February, 1918, while in the United States Army, had been operated upon for transplantation of pterygium in the right eye. Nine days after the operation solid silver nitrat had been applied by the army surgeon to the pterygium; and after this the eye was kept bandaged for 21 days. Since May, 1918, the patient had had six operations. When first seen by Dr. Finnoff, he had symblepharon of both eyelids to the pterygium. On November 10 the symblepharon had been loosened from the lower lid, and the conjunctival surfaces held apart for forty-eight hours with a lead plate conformer which was coated with paraffin. The conformer had been tolerated extremely well, and

the result so far was excellent, the patient being relieved of a previously existing very marked restriction of the eye movements.

DISCUSSION.—E. T. Boyd, Denver, thought that the McReynolds operation could be used to get rid of the pterygium in Dr. Finnoff's case after dealing with the symblepharon.

J. A. Patterson, Colorado Springs, believed that the patient would tolerate the conformer much longer; and that it would be very beneficial, both in maintaining the culdesac and in flattening out the pterygium. It would be well to leave the pterygium alone for some time to come, on account of the large amount of scar tissue present. He did not believe that the McReynolds operation could be successfully employed in this case.

G. L. Strader, Cheyenne, Wyoming, described the operation for pterygium formerly done by Dr. Gifford of Omaha. Dr. Gifford used to cut off the pterygium and take a piece of mucous membrane from the lip and transplant it like a Thiersch graft. The only trouble from this operation was that the patient had an exfoliation of epithelium, and about once a week had to put a little cocain in the eye and rub off the exfoliated epithelium with some cotton on an applicator.

W. C. Bane, Denver. This may be a case of a type in which recurrence will come in spite of all attempts at removal. If you wish to transplant the tissue I would advise taking conjunctiva from the other eye. I have not found it desirable to bring down tissue and stitch it over the area left after removal of a pterygium, because of the tendency of the pterygium to grow again.

W. C. Finnoff (closing) said that in operating he found the pterygium to be a dense band of scar tissue and very difficult to cut.

Choroidal Rupture and Hole at Macula:

W. C. FINNOFF, Denver, presented a man of 24 years whose left eye had been struck with a baseball in France last March. Since that time the vision

had been very defective in the injured eye. When first seen by Dr. Finnoff on August 16, 1919, the vision was R. 1, L. 0.2. Ophthalmoscopic examination showed the temporal side of the left disc to be slightly atrophic. There was a deep pigmented hole in the center of the macula; and about a half disc diameter to the temporal side of the macula there was a rupture vertically about four disc diameters in length. The rupture extended from the retinal epithelium thru the capillary layer and possibly the small vessel layer of the choroid, but not completely thru the choroid, for the large choroidal vessels could be seen.

Corneal and Iridic Tuberculosis.

W. C. FINNOFF, Denver, presented a woman 51 years of age who had come to Colorado for her health 20 years previously, and who came to him on August 18, 1919, complaining of hazy vision in the left eye for three weeks, which had cleared up with the exception of small black specks in the field. The left cornea showed several deep-seated corneal opacities in the substantia propria, the right media were clear but the disc slightly swollen and the edges blurred, and the vessels of this eye slightly tortuous. The left media were slightly cloudy and vessels slightly distended. The vision with correction of a fair amount of astigmatism was R. 1.3, L. 1.3.

On September 17 a small round elevated whitish nodule was visible on the pupillary margin of the iris of the right eye, and the right disc was again slightly red and swollen and the veins engorged. The left eye showed slight improvement. The iris condition cleared in ten days under the use of atropin. At the time of demonstration only three opacities remained in the cornea and the eye was much improved. The clinical symptoms resembled tuberculosis. Tuberculin had not been used, but the patient's eyes had improved along with the improvement in the general health.

DISCUSSION: Edward Jackson, Denver, had a patient who showed very numerous mutton fat deposits on the

cornea, but in whom several different tests with tuberculin had so far been entirely negative. X-ray examinations of the teeth also were negative. The eyes were improving under local treatment. In reply to questions Dr. Jackson said that he still felt that mutton fat deposits were suggestive of tuberculosis.

Cholesteatoma Invading the Orbit.

F. R. SPENCER and C. L. LARUE, Boulder, presented a man of 43 years who had been operated upon for a very large cholesteatoma of nasal accessory sinus origin which had extended into the orbit. When the patient first presented himself for examination on February 9, 1916, there was extreme proptosis of the right eye, and the eyeball was much lower than the left. The eyeball was in fact resting on the cheek. V. was R. 5/200 and J. No. 14; L. 15/20-1, and J. No. 1. There was a doubtful history of injury to the right eye twenty years previously. On account of a slight pulsation, and of the presence of varicose vessels, a diagnosis of probable pulsating exophthalmos was made. X-ray examination, nasal examination, Wassermann test, etc., to be followed by an exploratory operation, were all advised and refused.

The patient was next seen professionally in June 1919. The exophthalmos had increased. There was rather severe constant pain in the right orbital region, which was steadily increasing. At the lower corneal margin there was keratitis from exposure. All of the media were hazy. The nerve head was pale. Transillumination of the eyeball was negative. The vision of this eye was only 2/60. There was marked edema of the upper lids with more varicose veins at the outer canthus. X-ray examination showed that the frontal, ethmoidal and maxillary sinuses, as well as the orbit, on the right side were all cloudy. The general physical examination was negative. A probable diagnosis of osteoma was made.

On July 14, 1919, an exploratory operation was performed by a modified

Kroenlein method. As the incision was completed a milky fluid came out. A cholesteatoma approximately 7 by 5 cm. in size was removed from the orbit and the frontal sinus, as the floor of the latter was absent. Healing had been slow but uneventful, and only slight exophthalmos remained. The vision of the right eye was 1/60 on September 30, 1919. The condition was believed to be one of secondary cholesteatoma, and it was anticipated that a more extensive operation would be required later.

Ocular Prosthesis Upon Enucleation.

E. T. BOYD, Denver, showed a case of enucleation in which a Mules' vitreous sphere had been inserted in Tenon's capsule. Dr. Boyd had used a so-called sponge and the Mules' glass spheres, and the aluminum and fenestrated paraffin balls. The objection he had to the paraffin was that it weighed 31 grains, whereas the aluminum sphere weighed 15 grains and the glass 19. Dr. Boyd described the method which he employed for uniting the wound margins, in case of evisceration followed by insertion of the vitreous sphere. After circumcision of the cornea the ends of the tendons were brought up and united to the conjunctiva. Then the eyeball was eviscerated. The sclera was united in the horizontal line and the conjunctiva in the vertical. The fenestrated aluminum sphere when threatening to come out proved very hard to remove because of the filling of the cavity with tissue.

DISCUSSION.—J. A. Patterson, Colorado Springs, felt that he got excellent motility from stitching the muscles. Dr. Boyd said that of course the muscle tendons were picked up and drawn into relation with the conjunctiva before uniting the edges of the conjunctiva.

G. L. Strader, Cheyenne, Wyoming, had not done a Mules' operation for years, because he found it much more difficult to fit an artificial eye for such cases. In his experience he had never seen the sphere got rid of.

Pituitary Disease.

C. O. EIGLER; Denver, presented a woman who three months previously had had pain in the left eye and forehead when doing close work, and who said her sight began to fail in the left eye at that time. At the present time she had 5/60 vision, raised to 5/20 with correction. The field of vision was very narrow, and was retained above and to the temporal side only. On the nasal side and below there was no vision at all. The vision of the right eye was normal.

DISCUSSION.—G. L. Strader, Cheyenne, Wyoming, had seen the case with Dr. Decker about three months previously, when the patient had about 20/200 vision in one eye, the other being normal. The fields were a good deal contracted. Dr. Strader at that time somehow suspected that the girl was malingering, as at one time her eye got practically normal vision.

Edward Jackson, Denver. The history of the case, the disturbance of vision, was very strongly suggestive of hysteria or malingering. If the left eye were looked at alone, the disc would not be necessarily thought abnormal, but comparing the two eyes the left disc was distinctly paler than the right. There might be trouble about the hypophysis, and this would account for material changes of vision, and also for some mental aberration. There was enough difference between the two discs to justify careful investigation for an organic cause of the patient's symptoms.

Granuloma of the Iris.

J. A. PATTERSON, Colorado Springs, reported the case of a farmer aged 29 years, who had come complaining of failing vision, with a gradual falling off since last winter. There had been no pain in the eye, altho there was a barely perceptible conjunctival redness. The pupil of this eye was smaller than its fellow and was completely bound down by adhesions, and the color of this iris was darker than that of the other. The vision of each eye was 6/15, unimproved, and only faint outlines of the optic nerve could be seen.

After partially dilating the pupil with homatropin, it was found that there was great haziness of the anterior capsule of the affected eye. The optic nerve was pale and slightly indistinct at the lower margin.

The patient limped and claimed to be rheumatic, had pyorrhea, and was apparently unacquainted with the use of the tooth brush. A focal infection was therefore considered, this being favored by the quiet character of the disturbance. It was, however, found that the visual field was contracted. The left patellar reflex was sluggish, and no Romberg sign could be elicited. A sudden exacerbation of the iritis occurred, and within forty-eight hours there appeared in the upper part of the pupil a peculiar nodule which daily increased in size, until it reached a diameter of several millimeters. Sharp cross questioning brought the admission that the patient had had a chancre in January last. The nodule was of a reddish brown color, altho the iris was grey. The nodule was traversed by three minute bloodvessels running vertically. But the time of its appearance and the rate of its growth were against the diagnosis of gumma.

DISCUSSION.—W. H. Crisp, Denver, supported the dental etiology in this case. He described a case which he had seen, in a woman of 56 years, in whom a sluggish, intermittent iritis had gone on for seven or eight months under a surgeon in another city, and in whom a granuloma about two millimeters in diameter had developed on the pupillary margin of the iris; the condition having apparently been due to some badly abscessed dead teeth, removal of which had resulted in permanent cure.

Liebreich Ophthalmoscope.

J. A. PATTERSON, Colorado Springs, showed an old ophthalmoscope "nach Doctor Liebreich," who had invented the instrument in 1855. The ophthalmoscope itself consisted essentially of a slightly concave mirror, and the case also contained a small outfit of convex and concave lenses for insertion in the instrument.

DISCUSSION.—Edward Jackson, Denver, said that this form of ophthalmoscope was the first that he had ever bought. The lenses were all concave except one, the convex one being about four diopters, and being used for the indirect method. The others were to give a clear view of myopic eyes. Dr. Jackson believed that this instrument had been the one most widely sold in this country until the perfection of the Loring Ophthalmoscope about 1877. For a number of years the Loring instrument failed to displace the Liebreich, because the former cost \$35.00 and the Liebreich only \$5.00. Liebreich was one of Graefe's assistants, but left Graefe and went to Paris and afterwards to London. In getting out his atlas of ophthalmoscopic appearances, he got very much interested in the reproduction of colors, and in pigments; and went to the Latin quarter in Paris and studied among the art students there. When he died only a few years ago, he was probably over eighty years of age, and he had not been heard from in ophthalmology for a generation.

WM. H. CRISP,
Secretary.

BALTIMORE CITY MEDICAL SOCIETY, SECTION OF OPHTHALMOLOGY AND OTOTOLOGY.

November 19, 1919.

DR. A. E. KNORR, President.

"Some Considerations in Interpreting Muscular Imbalance."

Dr. Hiram Woods presented this paper previously read before the Southern Medical Association at its meeting at Asheville, N. C., and to appear in full in the Journal of that Association.

The paper dealt with a consideration of various means of estimating the meaning of muscular imbalance. The writer regarded the balance test as merely showing the muscular tendency without giving clue as to whether the imbalance was due to excessive or defective muscular action; that tests

which come nearer approaching natural vision than is afforded by the balance test are needed. These are, first, determination of static refraction with or without cycloplegia (the use of the latter, of course, dependent upon the age and other well known conditions); second, the presence or absence of diplopia with a red glass placed before one eye and the nature of this diplopia; third, the parallax or shutter test of Duane; fourth, individual power of muscles to overcome prisms, so-called duction.

With reference to the latter, the writer thought that attention had been fixed too exclusively upon power of the internal recti to overcome prisms, bases out (adduction). He regarded adduction as only the extent to which one could separate convergence without accommodation at any fixed distance. He preferred the term *positive relative convergence* as used by Donders, Landolt and others. This function could be increased by exercise, two or three hundred per cent in a few minutes and was no index to the real strength of the internal recti. On the other hand, he regarded positive relative convergence as of considerable importance because it should bear a definite relation to abduction or the functional force of the external recti. The latter are supplied by a single nerve and vary normally within only a few degrees. They form a fairly constant basis for estimating the relation of the two horizontal recti muscles to each other. The two vertical recti should be approximately equal.

In prism degrees, the following is the normal relation for 6 meters. Abduction 5° to 7°, below 5° suggesting essential weakness of the externi, especially if supported by the parallax test and homonymous diplopia by the red glass; over 8° is probably excessive and throws an increased burden on the interni unless the positive relative convergence can be developed. The normal relation between these horizontal muscles should be, one to four or five. The prism degree of power of the vertical muscles should be from 2½° to 3° each.

These principles were then applied to certain conditions met in routine practice: 1. Apparently high exophoria (8° to 12°) in the near unassociated with a distance exophoric imbalance. 2. A normal or very slight imbalance, either way, at 6 M. and lack of relief from refraction correction. This can often be traced to an essential weakness of the external recti muscles. The red glass usually shows homonymous diplopia and abduction is as low as 2° to 4° . Occasionally the externi can be exercised up to a workable standard, but, as a rule, prisms bases out are needed. 3. The use of prisms with bases placed vertically. These sometimes are of great help in hyperphoria and again are useless. The guide to their use is not the balance test, but is an excessive power of one pair of muscles. Two cases were mentioned in both of which the balance test showed hyperphoria, but in one the vertical muscles balanced each other with a $1\frac{3}{4}^{\circ}$ to 2° prisms and in the other one inferior rectus could overcome only 1° prism while the other overcame 4° . It is this difference that should guide us in the use of vertical prisms. 4. Essential muscular asthenia, a condition usually associated with some form of ill health. Its diagnosis is not thru the balance test at all, but an excessively low duction power of the entire group. Stubborn asthenopia is often a symptom and ordinary routine examination of refraction and muscular balance do not afford relief. The prism test of individual muscles is the only means the author knows of reaching a diagnosis.

Dr. C. A. Clapp read a paper upon the **Extraction of Twenty-nine Cases of Steel in the Eye**, which will be published in full in this Journal.

DISCUSSION.—Dr. C. J. Carroll asked Dr. Clapp if he preferred the posterior route in cases of recent injury. In answer, Dr. Clapp said he did prefer the posterior route.

Dr. Alan Woods wished to know if there was much difference in the nature of Industrial accidents from those

of War injuries to the eye. He explained the method that Colonel Lister had been using in France, which was the anterior route, and had apparently been a very satisfactory method.

Dr. Downey exhibited a very large piece of steel which had been removed from an eye.

Dr. Looper reported a case of a patient who had been struck in left eye with a piece of steel, puncturing eyeball, imbedded on layer of retina near posterior central part. The accident occurred on April 26, 1917, at which time it was impossible to remove the steel with a magnet by anterior or posterior route, as steel was nonmagnetic. On November 11, 1919, after Dr. Looper had returned from France, patient came into the office to show how nicely his eye was doing. Vision was 20/30 with no apparent ill effects.

Dr. Carroll thought the eyes containing nonmagnetic foreign bodies should be enucleated.

In closing the discussion, he stated that he believes (in answer to Dr. Woods) that these industrial cases differ quite markedly from the military cases, in the fact that practically all are magnetic foreign bodies and that some of them are very large, contrary to the small ones that occurred in the military service and that nearly all of them centered thru the anterior segment of the eye, and even in view of the fact that Colonel Lister stated that all cases should be removed anteriorly; that he felt that the case should be first X-rayed, and preferably removed by the posterior method, altho each case required the utmost surgical judgment in handling.

In answer to Dr. Carroll's inquiry as to sympathetic ophthalmia, he stated that the eyes that were lost were enucleated, and that no sympathetic troubles had developed to his knowledge.

EDWARD A. LOOPER,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

October 13, 1919.

DR. H. H. BROWN, President.

Papilloma of the Cornea.

DR. EDWARD F. GARRAGHAN presented a man, aged 70. Family history negative. No malignancy in family. Personal history: Married; wife living, good health; has nine children; has worked at stone cutting and has at times had slight injuries to eyes; does not trace present trouble to any particular injury to eye. He noticed a small red spot in corner of right eye 13 months ago which has gradually increased in size until it interferes with his vision. He was first seen by the speaker at the Illinois Eye and Ear Infirmary two weeks ago.

On the nasal portion of the right eyeball he has a large granular looking mass extending from the inner angle of the eye and spreading out beneath the upper and lower lids, but not attached thereto. There is some slight attachment to the conjunctiva but for the most part it is freely movable over his membrane. At the limbus there is a firm attachment, which extends over the cornea for about three-quarters of its entire surface. The growth is pinkish white in color, except a small portion near the lower border which is white. The tumor is very vascular and large vessels may be seen running over the surface of the tumor and thru the bulbar conjunctiva from the inner canthus to the tumor. The tumor has a raspberry-like appearance and is granular in consistence. It is rather soft to touch and bleeds easily when bruised or cut. There has never been any pain, no ulceration nor any enlargement of the preauricular glands.

The vision at present R. fingers 3 feet; L. 18/200. The tumor has all the characteristics of a papilloma which had its origin in the conjunctiva at the inner angle of the eye, and has gradually grown until it involved the cornea. A small section was taken for microscopic examination and the diagnosis

of papilloma was made, with the statement that there was not sufficient evidence to warrant a diagnosis of malignant change. The tumor will be completely removed and further microscopic examination will be made to ascertain the real nature of the growth.

Correction of Iridodialysis by Operation.

DR. ALBERT E. BULSON, JR., Fort Wayne, Indiana, read a paper which will appear in full in this journal.

Five Cilia in the Anterior Chamber.

DR. BULSON read the paper published in full, p. 128.

DISCUSSION.—Dr. Robert Von Der Heydt asked the essayist whether he did not use an acute angle keratome which he thought would be advisable in performing such an operation, and whether he had used atropin afterwards.

He would also like to know whether any localized atrophy of the iris had taken place in the reattached zone.

Dr. Charles P. Small said he did not quite understand how the iris was held in place after delivery. He would like to know where the final suture was used.

Dr. Heman H. Brown asked if the areas of the anterior capsule of the lens upon which the cilia had been riding for four months remained as they were at the time of the removal of the cilia, or did they clear up. He thought it was rather unusual for a foreign body to ride upon the capsule of the lens for four months, as irritating as cilia would be, without producing considerable disturbance.

Dr. Bulson, said he considered the case of cilia in the anterior chamber sufficiently interesting to report, from the fact that his first experiences with anything of this kind was where he removed one lash.

In looking up the literature he found that some 29 cases had been reported in the last 75 or 100 years. Several foreign confreres had reported cases, notably von Graefe, Mueller, and other well known ophthalmologists. One case was reported in which 13 cilia were removed. This seemed improb-

able. Just why five eyelashes got in the anterior chamber in the author's case seemed strange enough, considering that the pieces of wire probably was less than one-eighth of an inch in diameter, and the end of the wire made the punctured wound and carried the five eyelashes through the small opening into the anterior chamber.

A foreign body lying on the anterior capsule of the lens will interfere more or less with the nutrition of the lens, and in consequence there was cloudiness as a result of the irritation. This cloudiness apparently has not increased, as the patient's vision remains about the same.

Concerning the cases of iridodialysis, Dr. Bulson said that the corneal incision was made with a small, acute-angled keratome. In the first two cases the incision was made with the ordinary cataract knife, but in those cases the incision was too large. In the first case too large an incision was made because it was necessary to withdraw the bridge of iris in order to fix it. The stitch was carried thru the conjunctiva, thru the iris, and out thru the conjunctiva to anchor the iris, but as might be expected that drew the iris out and distorted the pupil greatly. It did pull the bridge of iris out away from the visual center, and in that respect the operation was satisfactory.

In the second case the incision was made with the ordinary cataract knife, and again he thought the incision was too large. The iris slipped back. After the eye had quieted down another attempt was made to correct the iridodialysis and at that time the incision was made smaller and the bridge of iris fixed in the wound where presumably it remained, tho the patient was soon lost to view.

In the last case a very small opening was made with a sharp pointed keratome. The object should be to make the opening just as small as can be made in order to pass the closed iris forceps thru and get hold of the bridge of iris. The torn edge was pulled slowly up into the wound, and the knuckle of iris was quite sufficient to block the wound where it remained.

The pupil was distorted slightly, but as previous to the operation the iris was lying over the visual center and interfering with the vision as well as disturbing the cosmetic effect, the result of the operation was satisfactory to the patient as well as to the operator. The author said entanglement of the iris was usually feared in a wound and yet it happened not infrequently with no resulting harm.

The operation as performed is mentioned in some of the textbooks, as being a risky procedure. He was merely reporting this with the idea of eliciting some discussion. In these cases there was no bad result, and in the case Dr. Wood reported, he did not consider it a very risky procedure.

Up to the present time, outside of a decided discoloration of the iris in that portion which had been detached from its attachment, there had been no marked evidence of any atrophy. The patient's eye was now free from irritation and she had fairly good vision.

Unilateral Proptosis.

Dr. MICHAEL GOLDENBURG reported the following two cases:

CASE I. A man 26 years of age, married 3 years, one child. He has been wearing glasses for the past six years. Vision had always been about the same in both eyes. However, there had always been a slight difference in the size of his eyes as evidenced by the photographs of 3 and 6 years ago. But he is sure that his vision in the right eye was good up to three years ago, when it gradually started to fail. His personal and family history is very good.

Upon examination the right eye was found to be markedly proptosed. Eyelids, conjunctiva, cornea, and anterior chamber negative. Pupillary reaction to light and accommodation good. Tension normal; vision 15/200 with difficulty. Left eye negative in all respects, and vision 15/15.

Under mydriasis the following was noted. Pupil dilated equally and mildly; media, negative; disc apparently small; temporal side well defined; nasal side slightly hazy, not due to exudate, but

as if unable to focus ophthalmoscope perfectly, which the speaker believed was due to its distorted position. The disc protrudes forward about six D. Vessels are clean cut, slightly tortuous, but in direct ratio to the forward position of the disc. There are no evidences of a perivasculitis, or fluid stasis. The fine feathery arrangement seen in inflammation is absent. The forward protrusion of the disc includes more than the nerve head, it also includes the posterior pole of the eyeball, as if something hard was pushing it forward.

It would appear that this degree of hyperopia was artificial. X-ray pictures (flat pictures) disclosed nothing. Two sets of stereos added nothing to our knowledge.

Buphthalmos, Secondary to Ophthalmia Neonatorum.

CASE II. A child one year of age. The baby was born at home. The mother does not know if drops were instilled at the time of birth. On the second or third day pus appeared in both eyes. This was treated as far as she knows with argyrol. Bacterial examination made, when the child was three weeks of age, disclosed the presence of the diplococcus of Neisser. When six weeks of age the pus disappeared. At this time bulging was already noticed. The child was then treated with two per cent atropin until 9 months of age. For the past three months the child has received no treatment.

Upon examination a leucoma adherens was found of both eyes, with nystagmus. Both eyes were very large and the left much more so. Tension was markedly increased. The anterior chambers were obliterated.

Upon discussing the case with the other men in the service as to what could possibly be done for this child, the treatment first tried was that of reducing the tension with the hope of at least saving the optic nerve and possibly later trying some corneal surgery. Ether anesthesia was used. A conjunctival flap was made with the idea of doing an iridotaxis opera-

tion. A small keratome incision was then made about two millimeters back of the limbus and an iris forceps was inserted, but the iris was so bound down that nothing could be accomplished. The speaker then went in with a small blunt hook and loosened up the iris which seemed sufficient, but still he could not pull the iris out and decided to do an iridectomy. The child made an uneventful recovery. We now have an anterior chamber, the tension is surely lower than the left eye, and the mother is sure the child is able to recognize objects. The nystagmus seems to be somewhat reduced.

DISCUSSION (Case I). Dr. Bulson asked whether there was any limitation to the movement of the eye.

Dr. Goldenburg replied, apparently not.

Dr. George F. Suker asked what the patient's vision was at the present time.

Dr. Goldenburg replied, 16/25 with the correction.

Dr. Oliver Tydings asked what the correction was now.

Dr. Goldenburg replied, 9 1/2 D.

Dr. Bulson asked as to the condition of the vascular system.

Dr. Goldenburg replied, he has no tachycardia; no possible exophthalmic goiter; no Graefe; no Moebius. Three years ago his vision without glasses was just the same as the left eye. The process started about three years ago.

Dr. George F. Suker, stated that inasmuch as the patient still had approximately 20/20 vision and, after carefully scrutinizing the two former photographs of the case, he labored under the impression that the right eye was not at that time in the same position as the left one. Taking this fact into consideration and the clear media the patient has, there was no doubt something could be done. The little swelling of the disc was suggestive of an infiltration, such as one would see in a beginning papilledema. The eyeball can even now be pushed back into the socket without any particular pain. At the present time the

only thing he considered feasible and justified was a modified Krönlein operation so as to have a large field for exploration. He did not think it was feasible to do a canthotomy and explore the orbit in this way as one might do more damage to muscles and increase the proptosis more than it was at the present time. He thought one would be safe in doing a Krönlein; but, the patient should be kept under observation for a considerable time; and, as long as vision could be maintained at the present point without undue suffering or disfigurement, he would advise leaving the eye alone.

Siderosis Bulbi.

DR. ALFRED N. MURRAY reported the following case of a patient who was boring on a one inch plate of steel with a bit, when some particles of steel flew off. This was on the 6th of January, 1919. At the time, it was recognized at the factory that there was a foreign body in his *right* eye. No attention was paid to the left eye. About the third day after the injury there was a slight irritation of the left eye and some slight blurring of vision. The blurring continued and increased until about the fifth month, when the vision was almost completely gone in the left eye. He could recognize movement of the hand at that time, that is, in June, but since then the vision has been reduced to faulty projection. There has been scarcely any irritation of the eye during this entire period, except for the first few days following the accident. The location of the foreign body was demonstrated by the Sweet chart as being ten millimeters back of the cornea and seven millimeters to the temporal side; therefore, suspended in the vitreous. The X-ray picture showed it to be about a millimeter in all of its diameters. The probabilities are the preliminary loss of vision was due to a slight hyalitis which gradually increased; encapsulation of the foreign body following. In course of time low grade choroiditis developed, followed by lenticular changes which resulted in a total cataract.

The condition of siderosis bulbi is an unusually interesting one, and is seen only with maximum dilatation of the pupil. This case shows very clearly, 13 distinct round, rust-colored spots, corresponding quite well to the position of hours on the dial of a clock, and arranged quite symmetrically. On close examination with the loupe, there are to be seen some fine, irregularly distributed, dust-like spots at the lower part of the lens. All of these spots are underneath the capsule of the lens. They are shown only with full dilatation of the pupil. The lens is cataractous, but it is more or less a diffused cataract, the lens striae not being visible. He has advised enucleation of the eye, on account of the possibility of sympathetic ophthalmia. In this case the siderosis involves not only the lens, but the iris as well. When the pupil is not dilated the iris presents a rusty color, not a normal greenish or brownish color, but what impresses one as a pathologic coloring.

There is no question whatever in the mind of any one after seeing this iris in comparison with the iris of the other eye but that this is a comparatively recent abnormal condition, and not a condition of heterochromia iridis.

The speaker was not able to account for the development of complete cataract in this case, or as to why it should have occurred without direct injury to the lens, unless it developed as a consequence. Assuming the foreign body is seven millimeters to the temporal side, that would bring the point of perforation about the limbus, in which case it would not have penetrated the lens itself, but the zonule—that is, assuming that it flew directly at the eye.

DISCUSSION. — Dr. Brown asked whether there was any pain or inflammation at the time.

Dr. Murray replied, no.

Dr. Harry S. Gradle asked where the foreign body struck the eye and the site of perforation.

Dr. Murray replied, that he could not find the site of perforation. The foreign body was but a millimeter in

diameter. There is no scar in the cornea.

Dr. Gradle asked whether there was any history of previous trauma to the eye.

Dr. Murray replied that there was not.

Dr. Gradle said the spots symmetrically arranged might be the result of a sudden blow on the anterior portion of the eye.

Dr. Murray replied that would not account for the colored spots, and the color of the iris, which was similar to the color of the spots in the lens.

Dr. Gradle said it seemed to him that the coloring of the spots was unusually red for siderosis. He had seen cases of siderosis and the spots were not exactly that color.

Dr. Murray replied, the rust spots could be dark or light. There might be a variation in intensity. The lens was cataractous, which might alter the color by contrast.

Dr. Gradle said they were uniformly red and of hyalin consistency. This might be a superficial observation. He would like to ask Dr. Murray how he made the diagnosis of siderosis and excluded some of the other conditions that might be confounded with it?

Dr. Murray replied, that nothing but siderosis could produce such a picture as this; the siderosis of the iris positively confirming the diagnosis. Hemorrhage could produce that appearance of the iris, but it could not produce these symmetrically arranged spots under the capsule of the lens.

Dr. George F. Suker said he would like to ask Dr. Murray a hypothetical question. Might it not be a case of heterochromia? He agreed with Dr. Gradle that the color was too intense to be siderosis. Might it not be a case of cataracta punctata rubra and the foreign body simply producing a traumatic cataract in addition? Maybe the patient did have normal vision at one time.

He asked this question for the reason that a year ago in May it was his good fortune to examine a soldier who had 20/20 vision, and on dilating the iris he found red spots underneath the an-

terior surface of the capsule of the lens. This soldier went abroad, and when he returned he had a traumatic cataract. The red spots in the lens of this soldier were identical with the ones seen in Dr. Murray's case. He also had heterochromia. These rust colored spots could hardly result from the dissemination of oxidized iron. For the foreign body was only one millimeter round, and these thirteen or so spots are now larger than a millimeter by a good deal, and it was hardly to be supposed one millimeter of substance could give such numerous oxidization spots. Cataracta punctata rubra is always underneath the anterior capsule of the lens and usually in the periphery. Furthermore, the lens might have been injured because it appeared to him the lens was subluxated from swelling or otherwise, because the anterior chamber was obliterated at one angle. The fact that the iris dilated ad maximum and presented these red colored spots was somewhat unusual unless it was a congenital affair, because in the majority of cases of siderosis bulbi in which deposits have taken place there was more or less immobility of the iris, and more or less localized traumatic iritis, and consequently a destruction of the iris tissue. If the iris was intact he was inclined to believe there was a double lesion, a congenital cataracta rubra as well as a secondary traumatic cataract. From a hasty examination he should take it to be a case of cataracta punctata rubra with a penetrating foreign body causing the secondary conditions. It appears that these rust colored spots in Dr. Murray's case are underneath the capsule, while in siderosis the spots are usually on top of the capsule.

Dr. Robert Von Der Heydt, in referring to the remarks of Dr. Gradle, who mentioned the possibility of a previous blow to the eye, and suggested the condition might be one of "Vossius Ring-clouding," altho he did not use that term, said, "In the latter condition there is a ring of deposit on the anterior lens capsule, composed of blood coagula, iris debris and pigment due to the impact. However, in the case

shown by Dr. Murray we have these spots under the capsule. They are proliferations of the lens epithelium and have taken up the iron oxid. The case is one of siderosis bulbi, the dots a rare manifestation, however clinically recognized and described by many authors, including de Schweinitz and Axenfeld.

Dr. Murray said the history of this case, spoke in favor of siderosis bulbi. In a congenital condition it was not uncommon to have both eyes involved, in the majority of cases. If one found the condition in one eye, he was likely to find it in the other, and to find other earmarks of congenital defects. If Dr. Suker could see the undilated pupil there would be no question whatever that this was a pathologic appearance of the iris and not a heterochromia iridis.

As to perforation of the lens, the localization showed that it must have perforated the zonule. He did not think it would penetrate the lens itself in that location unless it went diagonally thru. Considering the injury and the fact that the man's vision began to blur three days thereafter, and became gradually reduced in five months to hand movement, it certainly speaks for a traumatic condition.

As to congenital cataract he saw no reason why that should show up in five months. The man's vision was normal until the accident. He had never noticed a difference in the color of his eyes. While the speaker wanted to consider every possible aspect of the case, it was still his opinion that the case was one of siderosis bulbi. Since there was a foreign body in the eye as shown and localized by the X-ray, known to be metal, following a definite injury, a certain length of time elapsing between the injury and the development of visible signs so absolutely characteristic of siderosis bulbi, with symmetrically arranged round rust colored spots, seen only when the pupil was dilated to the maximum, he was willing to stake his reputation on the fact that it was a case of siderosis bulbi.

Dr. Suker stated that Dr. Murray

had misunderstood him, in that he did not say the case was one of congenital cataract but a cataractous process due to the injury which the man had received. One could have cataracta punctata rubra with normal vision. He had seen three such cases in which the condition was unilateral. The soldier he had referred to was in the Walter Reed Hospital under the charge of Dr. de Schweinitz who studied the case very carefully. The case was considered by Dr. de Schweinitz as a novel one, and the cataract the man had received was the result of concussion. When he saw the iris the year before he had these spots with clear media, and they were underneath the anterior capsule of the lens.

ALFRED N. MURRAY,
Secretary.

ROYAL SOCIETY OF MEDICINE

Section of Ophthalmology.

Wednesday, December 3rd, 1919.

MR. W. T. HOLMES SPICER presiding.

Keratitis Following Injury.

Mr. G. POTTS showed a case of keratitis following an explosion of black powder. The powder had scorched the cheeks and eyes, and nothing could be seen of the conjunctiva or sclera or cornea as separate structures. The boy was placed under cocain, and the sclera and cornea cleared. Improvement was setting in, and the vision of the right eye was 6/6, of the left 1/6.

Retinal Detachment.

Mr. POTTS also showed a patient with detached retina and an unusual condition of the conjunctiva. In 1900 the patient contracted rheumatism while in the South African war, and had frequently had rheumatic attacks since. The eye trouble dated from April, 1914, commencing with iritis in the left eye. The right conjunctiva was thickened and swollen, the sclera edematous and thickened, and had a fatty appearance.

DISCUSSION.—Dr. A. Hugh Thompson thought the signs pointed to a new growth, and that the nature of it was tubercular.

The President said it reminded him of the appearances in some syphilitic cases.

Mr. Potts said he had not had a Wassermann done.

Aneurysm of Cavernous Sinus.

Mr. MALCOLM HEPBURN exhibited a patient with an aneurysmal varix of the cavernous sinus. He brought the case in order to elicit opinions as to whether anything further could be done. The man had had his common carotid tied, and vision in the prop-
tosed eye was at present 6/6, but the patient was troubled with noises in the head. Some people said tying the angular vein, or other prominent vein did as much good as tying the common carotid. He felt skeptical about that, but the man had a dilated supraorbital vein, and he wondered whether anything could be done to that.

DISCUSSION.—Mr. Charles Higgins spoke of a case in which a prominent vessel, not the carotid, was tied and the patient was cured.

Mr. Percy Flemming spoke of five cases in which tying the carotid was carried out, and in which the hemorrhage was very severe, and in consequence of that experience he advocated withholding anything further unless the case got worse.

Mr. J. H. Fisher said in some cases the carotid was injured in fracture of the base of the skull, while in others the artery might burst spontaneously on account of atheroma, and the treatment followed would depend on which category a case came into. If ligation were decided upon, it was most important that the patient should be kept at rest in bed for a long period after it had been performed. He thought at present such patients were discharged too quickly.

Mr. R. R. Cruise related a case of his own in which several vessels had been tied in the effort to relieve the distressing head symptoms following gunshot injury, symptoms which made the life of the man practically unbearable.

Tumour of Choroid.

Mr. GOULD showed a case of tumour of the choroid.

Restoration of Orbit.

Mr. OLIVER showed a case of gunshot wound in the left eye, leaving a very large orbital cavity, which he reduced to a size to enable it to take an artificial eye by transplantation of rib cartilage.

Ophthalmic Physicians.

DISCUSSION ON DR. RAYNER BATTEN'S paper on "The Need for Ophthalmic Physicians for the Advancement of Ophthalmology," read at the previous meeting (see p. 55) was then taken up.

DISCUSSION.—Dr. C. O. Hawthorne said the paper of Dr. Batten was as interesting as it was unconventional. It was unusual, even unprecedented, to see a surgeon clothing himself with sackcloth and ashes. He, the speaker, had said on more than one occasion that a considerable part of the field of ophthalmology required not the art and craft of the surgeon, but the diagnostic and therapeutic methods of the physician, and he had then been severely criticised for the statement. With the general spirit and motive of the paper of Dr. Batten he was in agreement, but he did not quite agree with the proposed name "Ophthalmic physician," and he would equally object to be known as a nonophthalmic physician.

He would not undertake to say whether the cooperation of physician and surgeon in such conditions as conical cornea, detachment of retina and cataract would be fruitful, but that feeling of uncertainty did not apply to cases in which defect of sight was an evidence of nervous disease, cardiovascular disease, diseases of the kidney and of the blood. The symptoms he had in mind were ocular paralyses, disturbances of the pupil, the cycloplegias, optic neuritis, optic atrophy, cases of retinitis, and retinal and other intraocular hemorrhages. Each one of these required the investigating methods of the physician. It was a mere accident which led the patient to go, in the first instance, to the ophthalmologist or to the ophthalmic hospital, and if the cases were to be treated adequately in ophthalmic hospitals,

those institutions must have the requisite equipment, beds, nurses and medical staff. He did not think the position taken up by Dr. Batten in his paper could be challenged: it concerned the good repute of the profession, the progress of scientific medicine, and the welfare of the individual patient.

Mr. Charles Higgins pointed out that the custom, when a general practitioner sent a case to the oculist, was to report the result of his investigation, and state what specialist ought to be seen: while in hospital work the same relegation to the proper man was carried out.

Mr. W. Lang agreed with Mr. Higgins.

Mr. Ernest Clarke said London was the only place which insisted that the staffs of ophthalmic hospitals should consist of fully-qualified general surgeons. The remedy for the present position of matters was, he declared, to urge the ophthalmic students of the future to learn more general medicine: the great need was for the oculist to be able to diagnose the various conditions which had been mentioned, so as to insure the patient getting to the right man. The solution would be found in a broader range of education.

Mr. E. Treacher Collins did not consider Dr. Batten's presentation of the position was either pleasing or true to nature. The speaker sketched the gradual displacement of physicians by surgeons on the staff of the Moorfields Hospital since 1804. Those who had been ophthalmic surgeons to a general hospital knew that much of their time was spent in the medical wards helping the pure physician who had not troubled to learn the use of the ophthalmoscope in the diagnosis of his cases. The present discussion hinged largely on a question of name. Certainly ophthalmic surgeons were called upon to deal with more than surgical cases. As knowledge advanced, there was an inevitable tendency to split it up into departments, and that meant that there were borderline cases which were liable to be overlooked by rigid devotees of one department or the other. It was,

therefore, an advantage to have men to take up two branches, constituting a kind of liaison between the two. There was really need for an ophthalmic physiologist, for an ophthalmic pathologist, for an ophthalmic mathematician; but the greatest need of all was the complete ophthalmologist, by which he meant the man who was eager to know everything which could be known about any disease in which the eye could be affected.

Mr. A. W. Ormond contended that the London M. D. should be regarded as equally valuable for a post on an ophthalmic hospital as the London M. S. But he would object to ophthalmic staffs being divided into those who operated and those who did not operating at all. The need was for the specialism to be broader, not narrower. He reminded the meeting that surgeons in eye work not infrequently referred cases to the physician fruitlessly. Men should be given more time for the study of the medical side: at present the younger members of staffs were inundated with refraction work.

Mr. Leighton Davies (Cardiff) thought one of the glories of the specialty was that it required a wide view of the field of medicine and surgery. He objected to the suggestion that the ophthalmic surgeon was not capable of investigating conditions revealed in eye trouble. A drawback to the present workers in the specialty was that they had to do the special work after they became qualified, but it had its advantages in a more general medical knowledge.

Professor J. H. Parsons agreed that the chief value of Dr. Batten's paper was the stress it laid on the feeling many ophthalmologists must have that they were not as fully qualified to deal with the medical as with the surgical aspects of their cases. He would go further than the opener, and say the ophthalmologist ought to be able to deal with physiologic optics, and the relationship of ophthalmology to industrial conditions. The essence of the discussion was the breadth of view which should be capable of being

taken, and he emphasized Mr. Collins' point, that those who worked at the specialty were ophthalmologists—neither physicians nor surgeons specially as such. To evolve better ophthalmologists meant that those who entered the ranks would have to study all branches of the two subjects to the fullest degree, and the opportunities

for this must be increased: at present they were faulty in many directions.

Mr. A. S. Cobbledick foresaw difficulty in the allocation of cases if both surgeons and physicians were on the staffs.

Dr. Batten briefly replied.

H. DICKINSON.

ABSTRACTS

Lister, A. E. J. Sclerocorneal Trephining by Elliot's Method. *Indian Medical Gazette*, August, 1919.

Lister regards Elliot's as the best method of "sclerotomy" at present available. He makes his incision exactly like Elliot's in extent; he raises the flap and splits the cornea with scissors; and lays stress on doing both at the same time and not raising the conjunctiva alone when getting near the limbus. He uses a 1.5 mm. trephine, holding that larger scars cause continual laceration and irritation. "In such cases the danger of infection passing thru the layer of conjunctiva covering the trephine hole, and causing panophthalmitis, the great and well-known danger in eyes that have been trephined, must be greater than in eyes where a moderate-sized trephine hole has been made."

He finds that if the trephine edge is not quite sharp its cutting powers are enhanced if the globe is fixed more firmly by a second pair of fixation forceps. He prefers removing the disc first by itself and not using it, by grasping it together with the iris, to steady the globe while doing the iridectomy. To avoid blood collecting in the anterior chamber he advises the operator to wait, after excising the disc and iris before replacing the flap, until all bleeding has stopped. Massage to remove the blood is bad in its effects.

If the disc gets into the anterior chamber it should be removed by iris forceps (Hess's are useful), or by irrigation. Irrigation is avoided as a rule, however, as the saline used is only approximate in composition to the

normal aqueous. Lister thinks his freedom from iritis may be due to the avoidance of the irrigator, tho he always applies atropin after every operation. Hyoscin and morphia before operation, or chloroform if the patient is very nervous, is advocated. The alteration in the shape of the pupil, which follows the entry of the trephine into the anterior chamber, is said not to occur if the patient is under chloroform.

F. P. M.

Holth, S. Filaria Loa in Orbit and Eyelid. *Norsk Magazin for Laegevidenskaben*, Sept. 19, 1919.

Holth presented before the Ophthalmological Society at Christiania, a captain of the infantry, who had been infected by the larva of filaria loa while in the Belgian Congo in 1910. The infection occurs thru the sting of an insect of the Chrysops species. The diagnosis had been made by an Italian physician shortly after infection.

Filaria loa is a snake-like organism of 25 to 30 mm. in length and 0.3 to 0.4 mm. in diameter. It inhabits by preference the loose connective tissue under the skin or between the muscles of the extremities where it can wander around even up to a rate of 1 cm. per minute. That it is often found, as in this case, in the tissues of the orbit, is indicated by an older name of "filaria subconjunctivalis." Its presence is suspected by rheumatoid pains, and the diagnosis is made by seeing and removing it. After some years the filaria, unless removed, becomes encapsulated and dies.

In this case it inhabited the left or-

bit, appearing at times under the skin of the eyelids; at one time the captain suffered a severe supraorbital neuralgia of one-half hour's duration immediately after which the filaria showed itself under the bulbar conjunctiva. It was known once to cross the bridge of the nose into the right orbit and return to the left. During long periods it seemed to be quiescent and caused no symptoms. On the 22nd of April it appeared in the upper eyelid, but before the captain reached the office in an hour it had disappeared. It is said that hot applications will serve to coax it out, but such had been tried every morning for some time without results.

D. L. T.

Rasquin and Dujardin. Prognostic Value of the Argyll-Robertson Pupil. *Ann. d'Ocul.*, 1918, v. 156, p. 393.

The authors have always been able to diagnose syphilis in cases showing this sign. It is a sign of syphilis and not tabes or general paresis; is one of the earliest signs of tertiary syphilis, and is very frequently found in cases where this disease is unsuspected. It develops gradually, sometimes rapidly, and once established remains indefinitely.

The examination is made as follows: The patient is placed in a dark room for a few moments, for the purpose of dark adaptation. By means of a concave mirror, light is reflected into the eye from a distance of 50 cm. If the contraction of the pupil is quick and distinct, the reflex is normal. If it is slow and of small extent, the mirror is removed to 1 m., and if at this distance there is no contraction, the reflex is considered abnormal. In testing the convergence, a plane mirror is held 20 cm. from the patient who looks straight ahead while one pupil is illuminated; then he is told to look at the mirror. Or, the plane mirror is held 1 meter from the patient and the light reflected on one pupil while the patient looks straight ahead. Then, he is told to look at a finger held close to his nose.

They examined 232 cases of beginning or typical Argyll-Robertson pupil. There were 6 cases of general paresis, 5 cases of cerebral or spinal syphilis, and 18 cases of proven tabes. In the remaining it was impossible to diagnose the form of the syphilitic affection or to give a prognosis. However, since cases of pure Argyll-Robertson pupil will ultimately develop tabes or general paresis, every case should be submitted to the following procedure:

(1) Bordet-Wassermann test of the blood; treatment according to the intensity of the reaction.

(2) Reactivation in case of a negative reaction.

(3) Lumbar puncture and examination of the fluid for the following points; (a) tension, (b) lymphocytosis, (c) albumin content, (d) globulins, (e) Bordet-Wassermann reaction, with treatment according to the intensity of the latter.

(4) Supplemental, Luetin test.

The reasons for the above are given. 95 cases of Argyll-Robertson pupil with no other manifest symptom of syphilis were examined according to this procedure, resulting in the following classification:

I. Argyll-Robertson pupil with meningeal reaction. (A) Bordet-Wassermann positive, blood and cerebrospinal fluid. (B) Bordet-Wassermann positive blood, negative cerebrospinal fluid. (C) Bordet-Wassermann negative blood, positive cerebrospinal fluid. (D) Bordet-Wassermann negative blood and cerebrospinal fluid.

II. Argyll-Robertson pupil without meningeal reaction but with Bordet-Wassermann positive for blood.

III. Argyll-Robertson pupil without meningeal reaction and with no symptom of active syphilis. (Bordet-Wassermann reaction negative for blood.)

(A) The Bordet-Wassermann becomes positive for blood after reactivation.

(B) The Bordet-Wassermann remains negative for blood after reactivation.

Prognosis. 1. (A) These cases are

the most likely to develop into general paresis or tabes. (B) In this group, there is the possibility of preventing both tabes and general paresis. (C) This group will probably slowly develop tabes. (D) This group should undergo reactivation. The prognosis is favorable. II. There is little prospect of either tabes or general paresis. The disease does not involve the meninges. III. (A) Refer to previous series. (B) As far as our present knowledge goes, these patients are cured, but should be watched.

C. L.

A. Grünbaum. Representations of Direction and Eye Movements.

Weekbl. v. Geneesk., June 7, 1919.

If somebody with a not too dull imagination is asked to imagine an object (with closed eyes), for instance, a red ball, he will answer regarding the place of location: "in front of me," or "to the right" or "left," etc. The visual representations "appear" therefore in these cases, as if they were ranged in the "objective" space, in which we also localize our observations. In the psychology and psychopathology of today exists a very general opinion, that the subjective space, in which our representations appear, is something entirely different from the space of our observations.

It would be entirely inexplicable for a physiologic theory of the representations if the reproduced representations, which go back to observation, show a general spatial quality, which is different in principle from the observed, and still has to be brought back to it. If the subjective and objective space were entirely different things, it would be inexplicable, how true hallucinations, centrally originated ideas, are still localised in objective space. Such theoretic questions demonstrate the fundamental significance of the question of the essence of the subjective space.

A. Grünbaum, a teacher of physiology at Amsterdam wishes to solve the problem not along the introspective route, but with more objective experi-

mental means. He started from the following consideration: The objective space is determined, because the observed objects are localised around the body I, egocentrically, to the right, up, etc. We can also localise the representations of the imagination egocentrically, which common self-observation teaches. The egocentric localisation is in a certain way bound with the corresponding ocular movements during observation; which are therefore signs of the momentary fixed adaptation with the objective space. It had therefore to be investigated, if with egocentric adaptation in subjective space of objective signs of ocular movements. If this is so it may be concluded with great probability, as adaptation to objective and subjective space shows itself in the same manner that both in principle are of the same nature, and in any case are not widely separated.

Grünbaum's experiments were thus conducted. The person was asked to conceive or represent optically as distinctly as possible, when directed "cross to the left," or "circle up" as the object in the indicated direction. With fixed normal head-position the eventual eye-movements were observed with closed and open eyes thru a telescope. The observer photographed the moment, when the instruction was given, and the moment when the eventual eye movements began. The subject marked when good localised representation was present.

All persons experimented on made constantly eye movements in the direction corresponding with the instructions, before the localising of the representations.

With increasing reaction-times for the eye movements, increase correspondingly the reaction-times for the localised representations.

If the patient was asked to suppress the eye movements, but for the rest to do as in the foregoing experiments, he complained about the subjective difficulties of the localisation, and also of the representation of the object itself. Objectively, in all cases, where no distinct eye movements appeared,

a nystagmus or a series of interrupted eye movements was observed. The suppression of the eye movements had to be done by fixing of an imaginary point, or by staring in front.

If one may conclude about the psychic nature of the subjective space, from this objective connection between the eye movements and the localisation in the representations, we can accept, that the space in which our representation appears to be located, is itself not a reproduced representation, but coincides with the only space known to us, namely that of our observations.

Grünbaum hopes to have demonstrated, that even principal questions of psychology, which seemingly belong to the exclusive domain of introspection, can be brought nearer to their solution by objective experimentation.

E. E. B.

Coulomb, Dilatation of Orbit in Preparation for Prothesis. *Ann. d'Ocul.* 1919, v. 156, p. 344.

The author says that after a normal enucleation, the oculist has to choose between a prothesis which fits then but is subsequently too small, and one which is at first too large but which later will probably be of the right size, altho in the meantime it has fit badly and produced irritation. This can be obviated by previously dilating the cavity by a series of inserts of increasing sizes. These may be made of glass, vulcanite, a cast of the cavity of paraffin, or crown composition, or a reproduction of the cast in soft or vulcanized rubber. These should be used over a period of 3-4 weeks. On the other hand, the size of the cavity may be increased by the use of dilators, used gently and of gradually increasing sizes. He reports a case where a considerable increase in size was obtained by the latter method.

C. L.

Ronne, Henning. Determination of Astigmatism in High Ametropia "Hospitilstidende" Vol. 62, p. 933.

The author brings out that in high degrees of ametropia the degree of astigmatism as found by the readings of the ophthalmometer should not be ordered without modification. If the lens could be placed directly on the cornea there would be no call for any modification, but since the correcting lens is carried at a distance from the eye the refraction is changed. In low degrees of ametropia this difference is of no consequence, but in high degrees, it is considerable.

The author presents a mathematical table of corrections based on a distance of 12 mm. between the cornea and the lens to be worn. According to this table, e. g. on a case in which the spherical correction is + 13 D. and the astigmatism by the ophthalmometer is 6 D. the table shows that a cylinder of only 4 D. should be given. In all hypermetropia a smaller cylinder than that found by the ophthalmometer is called for, while in myopia the reverse is true.

D. L. T.

Muñoz Urra. Regeneration of Retinal Tissue. *España Oftalmologica.* v. 3, p. 125.

The author has proved the regeneration of the retinal tissues, by means of the new formations of axones and sprouts that do not have any special functions, because the functional restoration is not possible. In spite of the surprising efforts made by the axones to regenerate the nervous transmission, this can never be accomplished because the invasion of connective tissue renders those efforts ineffective.

F. M. F.

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METHYL ALCOHOL POISONING.

The newspapers are proclaiming in headlines the fatalities from wood alcohol. The moving pictures are presenting "the barrel that carried death to 70 persons." An educational campaign is going forward on a large scale. It is sensational, but important. Illegitimate liquor was always infamous for its bad quality, but it remained for the "improvement" of methyl alcohol, by removal of its disgusting taste and odor, to furnish a beverage that could equal and surpass ethyl alcohol as a destructive poison. All who have followed the literature of ophthalmology since the publication of the paper of Casey A. Wood and Frank Buller in 1904, (Trans. Sect. on Ophthalmology, A. M. A. 1904, p. 412) have known that still more important than the deaths are the cases of blindness it causes. They found 122 deaths and 153 cases of blindness.

The first reports of the evil effects of wood alcohol used as a beverage were of its causing blindness thru optic nerve atrophy in cases of "poisoning

by extract of Jamaica ginger," in which it had been substituted for ethyl alcohol. In one of these cases the manufacturers were sued by a victim for damages, on account of the blindness. They escaped by putting a witness on the stand, who at the close of his "expert testimony," took a good drink of wood alcohol in front of the jury; and, as soon as he could get away, followed it with an effective emetic. In one group of 5, who took part in a debauch, all became blind and one died. One who will recklessly throw away his life by wood alcohol may be no great loss to the community. But to have to support such a person in blindness is a serious calamity.

In the first volume of the Ophthalmic Year Book, methyl alcohol took the leading place among causes of toxic amblyopia; and every year since it has figured in the literature in this connection, and usually with as many reported victims as all other causes of toxic blindness put together. Its dangers are becoming pretty well known to ophthalmologists. But they still need to be urged upon other branches

of the medical profession, and upon the public; until some of the measures for the prevention of such blindness, suggested 16 years ago by Wood and Buller, are more generally put into effect.

The need of calling attention to this subject is the more urgent, because of certain clinical peculiarities of wood alcohol poisoning and blindness. The early period of intoxication is attended with no visual disturbances. The patient may become insensible and recover consciousness and get about again, without any impairment of vision. Or without losing consciousness, he may go several hours or days and seem to be largely recovered from the effects of the drug. Then he usually suffers severe gastro-intestinal irritation, cramps and vomiting, with rapid loss of sight.

This may go on to complete blindness lasting for several days, and then the sight almost always begins to come back. Useful vision is regained, and improvement continues several weeks. Then the vision begins again to decline, and usually goes down until it is as bad as it was in the early part of the attack. But this second loss of vision is almost always permanent, and is not prevented or limited by any form of treatment that can then be resorted to. This clinical course is the most characteristic feature of wood alcohol poisoning.

The objective symptoms are not pathognomonic. In the end there is optic nerve atrophy; which may have the appearance of primary atrophy, but generally shows some blurring of the edge of the disc. But at the beginning the changes revealed by the ophthalmoscope may not be striking. Swelling and edema of the nerve head may show neuritis, or may only give an appearance not very different from that often seen in eye strain. Pallor of the disc and contraction of the blood-vessels develop very gradually, and are never so striking as in quinin amblyopia. The field of vision may show a large indefinite central scotoma early; and later always undergoes great irregular and concentric narrowing; but

these are not peculiar to this form of disease.

A few cases of relatively slight methyl alcohol amblyopia recover, either spontaneously or under early eliminative treatment. Probably such treatment begun early enough would be quite effective. An efficient emetic, used in the stage of early intoxication might prevent death or blindness in all cases. But very few cases have come under treatment soon enough to give good results.

A man who has been on a debauch seeks to conceal his folly the day after; is slow to go to a physician, and is disposed to say nothing of the cause of his illness. If, as is usually the case, he supposes he has been drinking ordinary alcoholic beverages, he has no reason to think of wood alcohol poisoning, and will go out of his way to conceal the vital facts. In such a case it is essential that the physician be on the alert to suspect at once the nature of the case, and wood alcohol should always be under suspicion in connection with sudden loss of sight, connected with gastro-intestinal disturbances.

Other important facts are, that poisoning may occur thru inhalation, or thru extensive contact of the drug with the skin, or thru the continued ingestion of small quantities. Arising in this way the characteristic clinical picture of acute poisoning is lacking. Headache and obscure nervous disturbances may be the only symptoms that precede loss of sight. The occasions for exposure to it are varied so that the search for the cause must be widely extended. Shellacking the interior of beer vats has caused acute poisoning with blindness and death. In less confined spaces the effects have been headache and malaise. In several cases the alcohol has been used as an external application for "muscular rheumatism," and in one case it was the person who applied the drug, and not the patient, who suffered. Where it has been used in the habit of secret drinking, it may be quite impossible to obtain history; and the diagnosis must be made by exclusion of other causes.

The prognosis is not absolutely bad for cases seen early, but it should always be guarded. We have to deal with a poison, the effects of which continue to develop for a long time, after the taking of it into the system has stopped. It is a poison in which idiosyncrasy plays an important part, some persons being greatly and permanently affected by doses that would not do permanent harm to the majority of people; and it is used secretly in many food preparations, as a substitute for grain alcohol on account of its relative cheapness.

As to treatment it should be remembered: That it is always of utmost importance to get wood alcohol out of the system, at the earliest possible moment. One man escaped where all his comrades died or became blind, because he took raw eggs and vomited freely. Unfortunately the violent vomiting and purging, that mark many cases, occur after the poison has left the alimentary canal, and is acting on the nerve centers. The hot pack, Turkish bath, pilocarpin sweats, free ingestion of water, and possibly venesection and spinal puncture to help drain the drug out of the system, are the promising means at our command to accomplish elimination. But these measures must be resorted to promptly, and pushed vigorously to the maximum compatible with safety. Potassium iodid may be useful over a longer period, but it is doubtful if it has so good an effect here as in metallic poisoning. The intravenous use of sodium bicarbonat for acidosis, and every possible assistance to respiratory excretion, should also be counted as possible therapeutic resources.

E. J.

THE IRIS IN THE NEWSPAPERS.

Syndicated articles, selected for their spectacular aspect of professed scientific subjects, are a popular feature of Sunday newspapers. These are known to the craft as "patent insides," and are published simultaneously in many cities. Particularly as regards medical subjects, imagination has to be strained

to find a possibility of truth and seldom is there a probability. Even the medical press occasionally contained far-fetched theories; and so staid and conservative a journal as the *Scientific American*, was caught by a pseudo-scientific article on eye strain one year ago. The *Literary Digest* which exploited the ambrine treatment for burns, errs occasionally, the average newspaper all the time.

One of the most ridiculous manifestations of such medical nonsense has recently appeared under the title of "New and interesting facts from Science and Life." It is supposed that "all parts of the body are represented in defined areas of the iris of the sight organ." A wonderful diagrammatic chart, ruled like the spokes of a wheel, sections off the areas of the iris devoted to apoplexy, the ear, neck, lung, spleen, arm, diaphragm, pelvis, knee, kidney, and so on ad absurdum. This is the key to so called "iridiagnosis" for all parts of the body.

Strangely the thyroid gland is recognized but not the adrenal; the axilla and the clavicle are associated. The area of the leg is put in the center of the lower half of the iris, etc. Strange is it that the vast literature of ophthalmology which contains not only the known facts about the eye, but countless unproved or exploded theories as well, considers that the iris is but a muscular and vascular diaphragm; and that its pigmentation has little to do with disease, and there are no spots or segments therein connected with the little toe or the right arm.

In the particular article referred to, Dr. Cabot and the American Medical Association are quoted in the same breath with the great Dr. von Peckzely of Budapest, Hungary, who "discovered these records of nature in the eye when but a boy of ten years of age." The Reverend Niels Liljequist, a Swedish clergyman has made "iridology" his life work. Drs. H. Lahn of America and Anderchon of England, are said to be great "iridologists"—whatever that may mean. Altho "there are more things in heaven and earth,

Horatio, than are dreamt of in thy philosophy" yet "what fools we mortals be;" or would be if we believed what appears in the popular press.

H. V. W.

SPECIAL QUALIFICATIONS IN OPHTHALMOLOGY.

The Council of British Ophthalmologists has recently published a report upon this subject, recommending that universities and colleges provide for a special examination in ophthalmology, for those who propose to devote themselves to this branch of medicine. They also recommend that ophthalmology be made one of the elective subjects, on which men may be examined when seeking the degree, Master of Surgery. Those who seek such special examinations should produce evidence of two years' study of ophthalmology, one of which should have been spent holding recognized ophthalmic appointments.

The diploma in ophthalmology is granted by the University of Oxford only to those who prove: Attendance on a course of clinical ophthalmology in a recognized institution, for twelve calendar months; take the full two months course in the University, with the practical study of the anatomy of the eye and its appendages, including their development, and of physiologic optics and the physiology of vision. The required examinations include dioptrics, diseases of the eye, ophthalmology in general medicine, clinical cases, and ophthalmic surgery. It is evident that some such requirements and examinations are what the Council has in mind, to be adopted and put in operation by other teaching institutions.

This Council is a body that would be unlikely to sanction hasty reforms, or changes that had not been carefully considered. It is composed of all the Ex-Presidents and Presidents of the Ophthalmological Society of the United Kingdom, and of the Section of Ophthalmology of the Royal Society of Medicine, and nine elected members, four from each of the bodies mentioned

and one from the Oxford Congress. Its President is Sir Anderson Critchett, its Vice-Presidents, Sir John Tweedy and Priestley Smith, Treasurer, J. B. Lawford and Secretary, Leslie Paton. Every one of its nineteen members is an ophthalmologist of world wide reputation.

When so conservative a body urges a radical departure from the customs of the past, we are safe in concluding not only that the change is needed, but likewise that it will speedily be brought about. In other countries, as in the United States, a different sort of preparation for special practice will be expected, with real evidence that such preparation has been made. Those already engaged in ophthalmic practice, on the old basis, may well consider how best to put themselves in relation to this new attitude toward specialization in medicine and surgery.

E. J.

CORRESPONDENCE.

Stereoscopic Training of Convergence Insufficiency.

To the Editor:

The increased interest in the method of strengthening the power of convergence advocated in "The Stereoscope in Ophthalmology" is naturally gratifying. In the many letters received there is evident a failure to grasp the essential element to success.

It seems to be rather generally thought that a patient may be given a stereoscope and a set of cards and sent home to cure himself. Doubtless much can be accomplished in this way if one has to do with a sufficiently conscientious person, provided explicit directions are given, about the logical sequence in the use of the charts. Most readers seem to have missed the statement, oft repeated in the book, that a phoro-optometer with two revolving prisms, and a clip to hold the charts is absolutely essential. With this apparatus office treatments should be given two or three times a week. The prismatic element is insinuated by the decentration of the +10. spheres while the patient watches the fused

image. His progress can thus be noted and the home work intelligently directed. No one has tried this treatment with the phoro-optometer stereo-

scope without becoming enthusiastic in its use.

DAVID W. WELLS.

Boston.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon. Volunteers are needed in other localities.

DEATHS.

Dr. Lewis White Callan son of Dr. Peter A. Callan, died at the Yale Club, New York City, January 21st, of pneumonia, aged 43.

Dr. Warwick M. Cowgill, Lincoln, Nebraska, died of acute Bright's disease, December 29th, 1919, aged 61.

Dr. Mary C. Hollister, Chicago, died in Florida, January 2nd, aged 59.

Dr. Christian R. Holmes, Cincinnati, died January 9th, aged 63. His splendid work in the establishment of the Cincinnati General Hospital, and the fusion of the Medical College of Ohio and the Miami Medical College into the University of Cincinnati will remain as an enduring monument to his zealous efforts to promote the interests of the sick and the teaching of medicine in Cincinnati.

Dr. Arthur J. Lance, Portsmouth, New Hampshire, aged 49, died January 4th, from cerebral hemorrhage.

Dr. L. H. Lent, Middleton, N. Y., died at his home October 27th, 1919. He was past assistant surgeon to the Manhattan Eye and Ear Hospital, New York City, and consulting ophthalmologist to the Thrall Hospital of Middleton.

Dr. Charles McIntire, Easton, Pennsylvania, aged 72, died at his home January 4th.

Dr. Charles P. Pinckard, Chicago, aged 52, one of the founders of the Chicago Ophthalmological Society died at his home, January 27th.

PERSONALS.

Dr. J. M. Banister, of Omaha, has been elected to the Presidency of the Nebraska State Medical Society.

Dr. A. E. Davis, of New York, has been elected chairman of the section on Ophthalmology of the New York Academy of Medicine, and Conrad Berens, Jr., secretary.

Dr. Casey A. Wood passed thru Denver on the 22nd of January on his way to California. He was given an informal luncheon at the University Club by Doctors Jackson and Finnoff. Dr. Wood expects to spend the winter at Palo Alto.

Dr. Casey A. Wood delivered an address in Chicago on January 17th, before the Society of Medical History, on "Walter Bailey" the first writer of an Ophthalmic Treatise in English.

Professor Victor Morax, of Paris, is to be the guest of the Section on Ophthalmology of the American Medical Association at the New Orleans meeting, and will present a paper on "The Operation for Cataract in Glaucomatous Eyes."

SOCIETIES.

The Chicago Ophthalmological Society, at its annual meeting on January 19th, elected the following officers for the ensuing year:

President, Alfred N. Murray; Vice President, M. R. Fringer of Rockford; Secretary, Francis Lane; Counsellor, E. K. Findlay.

The seventh annual meeting of the Sioux Valley Eye and Ear Academy was held at Sioux City on January 21st. Papers were presented by Drs. G. F. Suker and A. H. Andrews of Chicago, L. W. Dean and C. C. Bunch of Iowa City, Harold Gifford of Omaha, and others.

The January meeting of the section on Ophthalmology of the New York Academy of Medicine presented a program on glaucoma in which Wm. C. Posey and Luther C. Peter of Philadelphia were participants by invitation. Wm. McLean and John E. Weeks of New York presented papers.

The Louisville Eye and Ear Society, at its annual meeting, held a banquet with a full membership of twenty-six present. Dr. Meyer Wiener was the guest of honor and delivered an address on "Focal Infections

and Their Relation to the Eye." Other guests present were Drs. Griffith of Owensboro, Reynolds of Paducah, Carson of Bowling Green, and Bledsoe of Covington. The officers elected were C. T. Wolfe, President; C. Bass, Vice President; Walter Dean, Secretary.

The Chicago Ophthalmological Society took the occasion of its annual meeting on January 19th, to hold a banquet in honor of its most illustrious and best beloved member, Dr. Casey A. Wood, who is retiring from active practice. Over one hundred members of the Society and old time friends of Dr. Wood, both from Chicago and elsewhere, sat at the tables.

The many sided activities of Dr. Wood's strenuous career; as an ophthalmologist, writer, teacher, soldier, ornithologist, etc., were referred to in appropriate speeches by Dr. Lucien Howe of Buffalo, Dr. Harold Gifford of Omaha, Col. Fielding Garrison, editor of the *Index Medicus*; Dr. Walter R. Parker of Detroit, and Prof. Henry B. Ward of the University of Illinois. Brig.-General Birkett of the Canadian Army, who is Dean of the medical department of McGill University, paid a glowing tribute to Dr. Wood as a man of whom his alma mater was justly proud.

More than a hundred letters and telegrams of congratulation were received by Dr. Wood, among them from Prof. Wm. H. Welch of Johns Hopkins, Geo. E. Armstrong, President-Elect of the American College of Surgeons, Harvey Cushing of Boston, President James of the University of Illinois, etc.

Dr. Wood was one of the founders of the Chicago Ophthalmological Society, and has always been most loyal in its support, and untiring in his efforts to build it up to a high level as a scientific organization. In recognition of his services to the Society, and in appreciation of his worth as a man of high professional attainments and of wide scholastic and scientific achievements, and particularly as a token of the high esteem in which he is held by his associates, the Society conferred upon Dr. Wood a certificate of Honorary Membership in the Society, and presented to him a "Testimonial of Appreciation." The volume, which is bound in seal, contains fifteen pages of parchment, on which the words of the text are embossed and beautifully illuminated. The book also contains the autographs of the members of the Society.

MISCELLANEOUS.

The Florida State Board of Health has

appropriated six thousand dollars for the establishment of a trachoma hospital.

The Herman Knapp Memorial Eye Hospital has received a bequest of five thousand dollars, from the will of the late William Saloman, of New York City.

The schools of Hamilton, Ohio, are being inspected for trachoma by Dr. Rose Hopkins, of the State Health Department, in cooperation with the local chapter of the Red Cross. When 3,900 pupils had been examined 104 cases of trachoma had been found.

Dr. Joseph L. Goodwin of the United States Public Health Service, has commenced his work in South Carolina in the treatment of trachoma.

The "*Archives d'Ophthalmologie*," founded 37 years ago by Panas, Landolt, and Poncet, having been discontinued during the war, resumed publication January, 1920, with the expectation of regular monthly issues. Truc, of Montpelier, Pollet, of Lyons, Frenkel, of Toulouse, and Duverger, of Strasbourg, have been added to the staff. Ophthalmologic society reports, reviews of journals, articles, and original essays will make up the Journal. The watchword since the victorious peace is "To Work!"

The Council of British Ophthalmologists has issued a report on examinations in ophthalmology and recommends that the universities and colleges should provide a special examination in ophthalmology for those who propose to devote themselves to it. Ophthalmology should be one of the optional subjects which a candidate can elect to be examined in for the degree of Master of Surgery of a university, or for the fellowship of a college of surgeons. Before presenting himself, the candidate should have studied ophthalmology for at least two years and held recognized ophthalmic appointments for one of these years. The special examination in ophthalmology should be written, oral and practical, and should comprise anatomy, pathology, optics, systematic and clinical ophthalmology and operative surgery.

CORRECTION.

In this journal for November, 1919, an error occurs in the report of a case of high myopic astigmatism by Dr. Clara A. March. On page 818 the sentence beginning on the fifth line should read: "Skiascopy at one meter under homatropin cycloplegia was as follows: Right vertical meridian was neutralized by — 27.sph. Horizontal meridian by — 13.sph. Left vertical meridian was neutralized by — 27.sph. Horizontal meridian by — 12.sph."

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

DIAGNOSIS.

- Brown, E. J.** Simple and Practical Tonometer. (1 ill.) *Amer. Jour. Ophth.*, v. 3, p. 48.
- Cowan, A.** Suggestion for New Perimetric Chart. (2 ill.) *Amer. Jour. Ophth.*, v. 3, p. 49.
- Elliot, R. H.** Diagnosis of the Cause of Certain Eye Conditions in Tropical Countries. *Med. Times*, London, 1919, p. 119.
- Ewing, A. E.** Test Objects for the Illiterate. (34 ill.) *Amer. Jour. Ophth.*, v. 3, pp. 5-23.
- Moss, L.** An Electric Ophthalmoscope. *Jour. Roy. Nav. Med. Service*, 1919, p. 336.
- Pelayo.** Diagnostic Value of Diplopia as a Symptom in Ocular Disease. *España Oftal.*, v. 6, p. 21.
- Spalding, J. M.** Eyesight Testing by Moving Objects. *Maine Med. Jour.*, v. 10, p. 146.
- Visual Requirements of Motor Drivers. *Lancet*, Jan. 3rd, 1920, p. 38. *Brit. Jour. Ophth.*, v. 4, pp. 28-40.

THERAPEUTICS.

- Berghausen, O.** Clinical Serology in Relation to Diseases of the Eye, Ear, Nose and Throat. *Ohio State Med. Jour.*, v. 16, p. 14.
- Darier, A.** Ocular Therapeutics. *Clin. Opt.*, v. 23, pp. 559-573.
- Heflebower, R. C.** Atropin. *Eclectic Med. Jour.*, v. 80, p. 4.
- Pauly, R.** Serotherapy and La Grippe. *Clin. Opt.*, v. 23, p. 584.
- Singleton's Eye Ointment and Other Nos-trums. *Jour. Amer. Med. Assn.*, v. 74, p. 193.
- Stocker, F.** Parenteral Injections of Milk in Ocular Disease. *Amer. Jour. Ophth.*, v. 3, p. 58.

OPERATIONS.

- Maddox, E. E.** Venesection as a Prevention of Expulsive Hemorrhage. *Amer. Jour. Ophth.*, v. 3, p. 23.
- Van Lint.** Abscess with Infection at Point of Fixation by Forceps Following Extrac-

tion of Cataract. *Le Scalpel*, Dec., 1919, No. 23.

REFRACTION.

- Ask, F.** Prevalence and Degree of Myopia and Visual Acuity in Academic Fellows. *Lunds. Univ. Arsskr.*, 1918, No. 12, pp. 1-47.
- Banister, J. M.** System for Measuring Astigmatism by Subjective Method. *Nebraska Med. Jour.*, v. 4, p. 352.
- Hartridge, H.** Marginal Aberration of Eye. *Proc. Physiol. Soc. London*, 1919-20, p. 8.
- Physiologic Eye Strain. *Proc. Physiol. Soc. London*, 1919-20, p. 1.
- Optics of Crystalline Lens. *Proc. Physiol. Soc. London*, 1920, p. 10.
- Henker, O.** Choice of Improved Correction in Heterogeneous Impairment of Vision. *Arch. f. Augenh.*, v. 81, p. 67.
- Phelps, K. A.** Visual Defects in West Point Cadets. *Amer. Jour. Ophth.*, v. 3, pp. 39-40.
- Schottenheim, O.** Stocks of Frames and Glasses. (1 pl.) *Graefe's Arch. f. Ophth.*, v. 98, pp. 141-151.
- Schwenk, P. N. K.** Petit Mal Benefited by Proper Correction. *Amer. Jour. Ophth.*, v. 3, p. 65.

OCULAR MOVEMENTS.

- Barbieri, A.** Complex Ocular Paralysis. *Rep. Oftal. Hosp. Buenos Aires*, v. 2, p. 137.
- Cantonnet, A.** Diplopia. *Rev. Gen. de Clin. et de Therap.*, v. 33, p. 385.
- Carson, W. E.** Paresis of Right Superior Rectus with Spasm of Left Inferior Oblique. *Amer. Jour. Ophth.*, v. 3, p. 59.
- Malagodi, A.** Physiology of Oculomotor Apparatus in Man. *Riv. de Patol. Nerv.*, v. 24, p. 99.
- Prevedi, G.** Nystagmus and Statistics of Amblyopia. *Arch. di Ottal.*, v. 26, pp. 123-136.
- Stassen.** Fatigue of Visual Apparatus in Miners. 229 pp., 20 ill. Liège: Vaillant.
- Viterbi, A.** Traumatic Heterophoria. *Arch. di Ottal.*, v. 25, p. 173.
- Zentmayer, W.** Unilateral Exophthalmos with Bilateral Ophthalmoplegia and Neuritis. *Amer. Jour. Ophth.*, v. 3, p. 62.

CONJUNCTIVA.

- Benham, E. W. Early Diagnosis and Treatment of Acute Inflammations of Eye. *Minnesota Med.*, v. 3, p. 73.
- Demaria, E. B. Subtilis Infection of Eye. *Semana Med.*, v. 26, p. 221.
- Forns. Syphilitic Chancere of Conjunctiva. *España Oftal.*, Oct., 1919, p. 13.
- Goldsack, L. C. Osteoma of Orbit. *Rep. Oftalm. Hosp. Buenos Aires*, v. 2, p. 131.
- Grosz, E. von. Trachoma in the German Army from 1913-16. *Arch. f. Augenh.*, v. 81, pp. 31-34.
- Hoor, K. von. Trachoma Prophylaxis. *Arch. f. Augenh.*, v. 81, pp. 28-31.
- Kiefer, H. A. Local Study of Trachoma (California). *Calif. State Med. Jour.*, v. 18, pp. 15-17.
- Kirchner, M. Trachoma in Prussia. *Arch. f. Augenh.*, v. 81, p. 12.
- Laiseca, N. F. Treatment of Trachoma. *Rep. Oftalm. Hosp. Buenos Aires*, v. 2, p. 133.
- Nicolich, M. Treatment of Trachoma for Diminution of Lacrimal Secretion. *España Oftal.*, Oct., 1919, p. 9.
- Nicolls, F. Eye Disease in Burma. *Med. Times, London*, 1919, p. 125.
- Silvio Francesio. Treatment of Granular Conjunctivitis with Carbon Dioxid Snow. *Rep. Oftalm. Hosp. Buenos Aires*, v. 2, p. 134.
- Stuckey, E. J., Tomlin, H., and Hughes, C. A. Trachoma Among the Chinese in France. *Brit. Jour. Ophth.*, v. 4, pp. 1-12.
- Vankirk, V. E. Typical Gonorrheal Ophthalmia. *Amer. Jour. Ophth.*, v. 3, p. 61.
- Wible, E. E. Phlyctenular Ophthalmia. *Amer. Jour. Ophth.*, v. 3, p. 61.

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- Crocco, A. Blue Scleras. *Rep. Oftalm. Hosp. Buenos Aires*, v. 2, pp. 38-44.
- Hiwatari, K. Histology of Corneo-scleral Junction. *Acta Scholae Med. Univ. Imp. Kioto*, v. 3, p. 277.
- Kirkpatrick, H. Epidemic of Macular Keratitis. (2 ill.) *Brit. Jour. Ophth.*, v. 4, pp. 15-20.
- Marinosci, R. Treatment of Hypopyon Keratitis. *Riforma Med.*, v. 35, p. 248.
- Pissarello, C. Corneal Apoplexy. *Arch. di Ottal.*, v. 25, p. 125.
- Schweinitz, G. E. de. Treatment of Hypopyon Keratitis. *Amer. Jour. Ophth.*, v. 3, p. 65.
- Wernicke, O. Reversal of Bevel of Cornea. *Rep. Oftalm. Hosp. Buenos Aires*, v. 2, pp. 13-19.

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- Cabannes. Argyll-Robertson Pupil. *Jour. de Méd. de Bordeaux*, v. 90, p. 502. *Abst. Jour. A. M. A.*, v. 74, p. 137.
- Guglianetti, L. Viscosity of Aqueous Humor. *Arch. di Ottal.*, v. 26, pp. 109-122.

- Hartridge, H. Shape of Pupil in Various Animals. *Proc. Physiol. Soc. London*, 1920, p. 6.
- Nicolau. Pupillary Changes in Syphilis. *Ann. de Dermat. et Syphilis*, v. 7, p. 283. *Abst. Jour. A. M. A.*, v. 74, p. 181.
- Zsako, S. Role of Aqueous in Variations of Pupil. *Ztschr. f. d. ges. Neurol. u. Psychiat.*, v. 44, p. 110.

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- Batten, R. D. Disseminated Choroido-retinitis. *Royal Soc. Med. Sec. on Ophth.*, Nov., 1919. *Amer. Jour. Ophth.*, v. 3, p. 53.
- Castro, A. F. Gyrate Atrophy of Choroid and Retina. *Rep. Oftalm. Hosp. Buenos Aires*, v. 2, pp. 100-105.
- Fernandez, H. U. Specific Iritis. *Rep. Oftalm. Hosp. Buenos Aires*, v. 2, p. 135.
- Gilbert, W. Chronic Uveitis and Tuberculosis of Iris. *Arch. f. Augenh.*, v. 82, p. 179.
- Latil and Ourgaud. Traumatic Cyst of Iris. *Marseille Méd.*, v. 56, p. 653.
- Neeper, E. R. Recurrent Iritis. Tumor? *Amer. Jour. Ophth.*, v. 3, p. 66.
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- Verhoeff, F. H. Syphilitic Retinochoroiditis Juxtapapillaris. *Med. Progress*, v. 35, p. 193.

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- Hirschberg, J. Sympathetic Ophthalmia Observed over Six Years. *Cent. f. p. Augenh.*, July-Aug., 1918. *Abst. Clin. Ophth.*, v. 23, p. 613.

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- Alcorta, M. F. Relation of Pressure in Anterior and Posterior Chambers of the Eye. *Rep. Oftalm. Hosp. Buenos Aires*, v. 2, pp. 19-27.
- Colombo, G. The Irido-Ciliary Adhesion in Elliot's Trephine Operation. (3 pl.) *Arch. di Ottal.*, v. 25, p. 101.
- Gradle, H. S. Cyclodialysis. *Amer. Jour. Ophth.*, v. 3, pp. 41-48.
- Menacho. Glaucomatous Iritis. *España Oftal.*, Oct., 1919, p. 12.
- Pichler, A. Case of Glaucoma in Battle. *Arch. f. Augenh.*, v. 82, p. 194.
- Schweinitz, G. E. de. Cyclodialysis for Glaucoma with Infected Conjunctiva. *Amer. Jour. Ophth.*, v. 3, p. 64.
- Wessely, K. Intraocular Pressure and Circulation of Blood. *Arch. f. Augenh.*, v. 83, p. 99.

CRYSTALLINE LENS.

- Fleischer, B. Myotonia Dystrophy and Cataract. *Graefe's Arch. f. Ophth.*, v. 96.
- Garcia del Mazo, J. Cataracta Nigra. *España Oftalm.*, Oct., 1919, p. 11.
- Kuhnt. Treatment of Secondary Cataract. *Zeit. f. Augenh.*, 1919, Ht. 1-2. *Abst. Clin. Ophth.*, v. 23, p. 589.

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Dameno, E. Atypical Circinate Degeneration of Retina. Rep. Oftalm. Hosp., Buenos Aires, v. 2, p. 136.

Gonin, J. Detachment of Retina. Amer. Jour. Ophth., v. 3, p. 57.

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Rauch, R. Influence of Atmospheric Pressure on Retinal Vessels. Med. Klin., v. 14, p. 1206.

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Strebel, J. Curability of Occlusion of Central Artery of Retina by an Embolus. Corresp.-bl. f. Schweizer Aerzte, Oct. 2, 1919. Abst. N. Y. Med. Jour., v. 110, p. 999.

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Agnostino, A. Quinin Amaurosis. Buenos Aires Thesis. Rep. Oftal. Hosp. Buenos Aires, v. 2, p. 129.

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Bordes, M. L. Q. Operation for Cicatricial Ectropion. (5 ill.) España Oftal., v. 5, p. 1. Oct., 1919.

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- Oetteking, B. The Fronto-Sphenoidalis of the Zygoma and its Bearing on Configuration of Orbit. Anat. Rec., 17, pp. 25-42.
- Ourgaud. Pulsating Exophthalmos. Marseille Méd., v. 56, p. 607.
- Soriano, F. J. Orbital Varicocele. (1 ill.) Rep. Oftal. Hosp. Buenos Aires, v. 2, pp. 106-128.
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FIG. 1. ANOMALY OF FUNDUS (FINNOFF)



FIG. 2. TUBERCULOSIS OF CONJUNCTIVA (COOVER)

ANOMALOUS CONDITION OF OCULAR FUNDUS.

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This case of probably congenital anomaly of the eye was presented at the Colorado Congress on Ophthalmology and Oto-Laryngology, August 4, 1919. It is of interest in connection with a paper of Dr. Gifford on Atypical Coloboma, see page 97.

As unusual fundus pictures are always of interest to the ophthalmologist, I take the liberty of presenting this case.

B. P. K., age 20, a mechanic by occupation.

The patient has always enjoyed good health and believed his eyes to be normal, except for a slight divergent squint, until six years ago when he had tonsillitis. While he was under a general anesthetic for the removal of tonsils, some ether was accidentally dropped into the right eye which produced some irritation and called his attention to this eye. At this time he discovered that he could see very little with it, and believed that the loss of vision was due to the ether.

The patient consulted me May 24, 1919, to learn the cause of his unilateral blindness, and to see if his divergent squint could be corrected. His vision with the right eye was 0.03, left 1.4. With the ophthalmoscope the media were found to be clear. Only the lower $\frac{2}{3}$ of the disc could be made out, and to the temporal and lower side of it a white scleral crescent $\frac{1}{3}$ disc diameter could be seen. The crescent is bordered with a band of pigment which is thinnest on the nasal side, and thickens out to $\frac{1}{3}$ disc diameter on the temporal side. A veil-like membrane is noted beginning on the disc and covering the upper $\frac{1}{3}$ of it. This structure runs upward and slightly to the nasal side, is funnel shaped, and the front part rapidly comes forward into the vitreous until it is best seen with a +8. D. lens. The base of the

funnel flattens, is quite far in front of the equator, and is bordered by a thin band of pigment. On the surface of the funnel, beginning at the disc, a greenish glistening fold can be seen farther forward in the vitreous, which later blends with the main mass as it comes forward at the junction of the middle with its upper third. To the temporal side and at the base of this fold a portion of the upper temporal vein can be seen. (See color plate III, Fig. 1.)

The distribution of the retinal vessels is anomalous also. The retinal artery makes its appearance to the nasal side of the disc opposite the beginning of the membranous fold and divides into three branches. One branch runs upward along the edge of the fold for a short distance and disappears under it. Another branch courses downward and to the nasal side and constitutes the lower nasal artery. The third branch takes a tortuous course across the upper portion of the disc for about two-thirds of its diameter, then bends acutely and runs downward, giving off small branches in its course along the disc. This branch corresponds to the lower temporal artery. Another artery, which supplies the upper temporal region of the fundus, is first seen emerging from the membrane which covers the disc. It passes over the temporal half of the membrane and dips down over its edge in reaching the retina, after which it passes normally to the upper temporal portion of the fundus.

One large vein is seen entering the disc. It is made up of three branches, two from the lower nasal quadrant, and one from the lower temporal. It passes over the disc and just before disappearing into the nerve head hooks over the artery. A second vein passes thru the veil-like membrane and receives branches from the upper temporal quadrant.

Because of the peculiar disc and the unusual arrangement of the retinal vessels, I believe this to be a congenital condition. A retinitis proliferans in this region would not be accompanied with an absence of retinal vessels in the upper nasal quadrant of the fundus. The anomalous position of the vessels also is very suggestive of a developmental defect.

ALTERATIONS IN TWILIGHT VISION IN OCCUPATIONAL NYSTAGMUS.

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Observations on the hemeralopia of soldiers seem to throw light on the pathology of miners' nystagmus, indicating that both these and similar conditions arise largely from over-fatigue.

In an article published in 1910 (1) I emphasized the importance of hemeralopic affections in relation to the nystagmus of coal miners. From measurements made with Nagel's adaptometer it was possible to study graphically anomalies of retinal adaptation causing these affections. But the pathogenesis of the changes was left undetermined.

Observations which I was able to make during the war on cases of hemeralopia occurring in soldiers have thrown light on this subject; and at the same time they help to make clear another question, the pathogenesis of professional (workers') nystagmus.

During the war the problem which presented itself was: Men who before the war or even during the early months of the war had good nocturnal vision, complained suddenly of poor vision at night; tho their vision remained good during the day; and no lesion, either of the visual tracts or of the fundus could be observed, which might explain the defect in retinal adaptation.

It is important to establish these facts because several observers have emphasized certain forms of hemeralopia, known before the war and observed also in combatants, notably hemeralopia associated with anomalies

of the pigment of the fundus, associated with lesions of the choroid or retina, with opacities of the cornea, and so forth.

The frequency of the cases of hemeralopia without objective lesions, varies with the reporter, but from none do they receive recognition as such. Personally at the Belgian front, I have observed this condition in nine per cent of all those coming to consult an oculist.

The particular symptoms of insufficiency of retinal adaptation are well known; and I shall not dwell here upon the clinical aspect of these affections. They have been described often during the war. I wish simply to show how I have been led to attribute hemeralopia among combatants to over-fatigue (2).

To sum up the causes, which from the clinical point of view underly change in twilight or night vision, I have arranged the following table.

I. HEMERALOPIA FROM A LOCAL CAUSE.

A. Hemeralopia from an external cause, as from dazzling.

B. Hemeralopia from a dioptric cause: Opacities of the cornea or of the lens; changes in the pupil; ametropia.

C. Hemeralopia from a local cause due to change in the retina.

1. Acquired hemeralopia: siderosis, neuro-retinal atrophy (as in glaucoma), chorio-retinitis, myopia, etc.
2. Congenital hemeralopia—Hereditary hemeralopia.

II. HEMERALOPIA FROM A GENERAL CAUSE.

A. Hemeralopia from malnutrition, as observed in orphanages, penitentiaries, among sailors, etc.

B. Hemeralopia from over-fatigue: as among combatants, workers, miners.

C. Hemeralopia in infectious diseases; malaria, syphilis, etc.

D. Toxic hemeralopia; from san-tonin, quinin, alcohol, etc.

E. Autotoxic hemeralopia; from disease of the liver, nephritis, etc.

F. Diseases little understood; retinitis pigmentosa, certain forms of hereditary hemeralopia.

By the exclusion of other causes of hemeralopia, and by the clinical study of this particular form, I have come to the conclusion that the principal cause of the hemeralopia of war should be sought in fatigue, in exhaustion (3).

It is not unusual to observe in combatants with acquired hemeralopia marked signs of depression, notably cephalalgia, vertigo, insomnia, tachycardia and arterial hypotension. Likewise the anomalies of peripheral vision, especially contraction of the fields for color, described by some authors (Knies, Jess, etc.) are to be observed in the over-fatigued or exhausted.

Nervous depression among combatants is only too easily explained by the fatigue and danger to which they are exposed, by the monotony and unhygienic character of trench warfare, by the lack of regular sleep and by the shocks to which the nervous system is subjected.

The presence of symptoms of depression in hemeralopic soldiers has been confirmed by several observers; Landolt (4) Teulieres (5), and Cailaud (6) in the French army, Danis (7) in the Belgian army, Paul (8) and others, of the enemy.

It is to be attributed to the influence of fatigue that the hemeralopia of war is found, if not exclusively, at least to a large extent in the infantry. Be-

cause of the continual change of place, the long marches, and the considerable weight of equipment (more than 30 kg.), the foot soldier is far more liable to exhaustion than those in other branches of military service.

Another reason for attributing war hemeralopia to over-fatigue is the fact that the proportion of cases in the Belgian army decreased according as the conditions of that army improved. My first observations were made in the latter part of 1914 and in 1915, following the battle of the Yser, at a time when the Belgian army had after successive retreats offered a desperate resistance under the most unfavorable conditions. To show the state of destitution of our army at that time, I shall offer but one example. Many of our men, having worn out their leather shoes, were obliged to make long marches to the trenches in wooden shoes, or even bare-footed. My statistics belong to this period. Nine per cent of those who came for ophthalmic consultation were hemeralopes.

This critical period for the Belgian army was followed by a veritable renaissance. A new army was somehow born of the old one, and simultaneously the proportion of cases of hemeralopia decreased. For 1916 and 1917 my statistics show only 3 per cent.

The same conditions existed in the Serbian army. After a perilous retreat across Albania numerous cases of hemeralopia appeared. (Nechitch.) (9).

There exists clinically an insufficiency of retinal adaptation, due pre-eminently to exhaustion, thru muscular and nervous fatigue, which one may designate hemeralopia of over-fatigue.

This form should be distinguished from hemeralopia due to malnutrition, for it can arise, as I have shown, aside from any alimentary defect, in subjects who in that respect are in very satisfactory condition.

It would be interesting to make tests with the adaptometer, to see whether insufficiency of retinal adaptation is not also present in other clinical forms of over-fatigue, or of asthenia; where it might easily pass unobserved be-

cause of the absence of the special conditions, chiefly nocturnal, under which combatants work.

How can an excess of muscular and nervous fatigue cause a change in retinal adaptation which manifests itself as hemeralopia? As the physiology of normal retinal adaptation is as yet poorly understood, one must review the facts of this special condition with great care. Fatigue, exhaustion, and emotion produce profound changes in the human organism. Interesting observations along this line were made among the soldiers. Vincent (10) especially has shown that over-fatigue lowers the alexic power of the blood serum. Hurst (11) insists that the emotions of combatants are followed by hyperadrenalism and hyperthyroidism and their consequences. One may therefore ask if the function of adaptation is not directly or indirectly affected by the same pathogenic factors.

In the studies which I have made of the question (12), I have shown that over-fatigue changes the functioning of the endocrin glands, or at least of some of them. I have next enumerated the things which tend to the impairment of retinal adaptation, also resulting in disturbance of the internal secretions.

The facts which I have just mentioned, explain also the hemeralopia so pronounced in the nystagmus of miners, the pathogenesis of which was unknown before the war. Like the soldier, the coal miner leads a dangerous and fatiguing life; the unfavorable conditions of which are well-known. It is not unusual to see, in coal miners afflicted with nystagmus, symptoms of nervous depression similar to those I observed in hemeralopic soldiers, especially cephalalgia, insomnia, hypochondria, arterial hypotension, etc.

Among coal miners with nystagmus I observed before the war in extreme cases a veritable neuro-ophthalmic condition, altho I do not claim that all coal miners afflicted with nystagmus are neurotic. Nystagmus aggravated by neuropathic symptoms is unusual.

However, these extreme cases direct

our attention to the pathogenic importance of over-fatigue, and of the nervous disorder which follows it.

Visual fatigue, manifested as nystagmus, results from the effort to see under poor conditions, as in the coal mines. This local sensorial fatigue added to general over-fatigue is of more marked importance in coal miners than in combatants in the production of hemeralopia. A whole series of well established facts confirms the poor conditions of work at the bottom of a mine from the point of view of vision.

Professor Nuel (13) insisted upon the importance of two factors which destroy the muscular equilibrium usually controlling vision; the failure to function on the part of the fovea, and the upsetting of binocular vision.

We must recall that it is above all the fovea which controls ocular movements. In a poor light, one sees not with the cones of the retina, but with the rods. The fovea has no rods and the macula has only a few. The better vision in a poor light is obtained by the extra-foveal portions of the retina, from 15° to 20° away from the fovea, and extending in a circle around it.

In the coal miner who does all his work in a poor light, the foveal vision, which would under normal conditions regulate the movements of the eyes, is lacking. Hence there results a sort of visual groping, from the incoördination of the movements and also from the visual fatigue.

On the other hand, binocular vision also must be maintained under abnormal conditions. The broken coal has an angular and crystalline surface. The lamp, lighting some of the facets, is reflected. Each eye sees different facets destroying binocular vision, and fatiguing the eyes.

There are other factors resulting from the conditions at the bottom of the mine, which contribute to visual exhaustion. It is scarcely necessary to mention among these the insufficient light which has latterly been considered the predominant influence in the pathogenesis of nystagmus. It has been shown that the number of cases

of nystagmus has increased with the introduction of safety lamps, which give but a poor light. In mines without fire-damp, lighted by acetylene or electricity, nystagmus is rare.

The necessity for looking upward when working at the bottom of a mine is also a cause of visual fatigue. Dransart (14) emphasized the importance of this factor as a cause of the oscillations of nystagmus. To these various causes of visual fatigue in coal miners, one may add the sudden and frequent passing from light to darkness in going down into and coming up from the mine.

It is to be remarked that hemeralopic affections identical with those observed to accompany the nystagmus of miners have been found in those doing work resembling coal-mining in its unfavorable conditions. For example in the building of the St. Gothard tunnel numerous cases of hemeralopia appeared among the workers.

I intend to make observations with the adaptometer to see whether this insufficiency of retinal adaptation does not appear in other clinical forms of over-fatigue; where the patient does not become aware of the defect, even tho it be marked, because he does not, like the soldier and miner, work under nocturnal conditions. This we know is the case with patients suffering from ocular disease like retinitis pigmentosa.

The influence of visual over-fatigue in producing hemeralopia is demonstrated by an observation of Percival (15), relating to a railway employee who passed the entire day in adding long columns of numbers. At length hemeralopia appeared and simultaneously nystagmic movements.

The nature of this twilight blindness in the nystagmus of miners, its analogy to hemeralopia in soldiers, the relation to fatigue and exhaustion, more par-

ticularly the latter, throws light on the pathogenesis of nystagmus. There is great uncertainty concerning the etiology of occupational nystagmus, Ohm attributes it to alcoholism, insufficiency of convergence, disturbances of the labyrinth and, finally, to poor illumination. It appears to me, however, that it is not impossible to clear up this problem when we hold to the solid ground of well-known clinical facts.

Nystagmus of miners does not consist wholly in the ocular displacements, but includes insufficiency of retinal adaptation; and equally general symptoms, which may be attributed to fatigue, exhaustion, symptoms usually slight but which can develop marked neuropathic manifestations. The different symptoms that characterize miner's nystagmus, to my mind show incoördination of the nervous system due to bodily and visual exhaustion, the depressed condition, arises not from a single factor, but in a concurrence of many general and local causes of varying importance.

The reader of works concerning the pathogenesis of nystagmus gets the impression that each author, thru his "amour propre"—quite human on the whole—obstinately defends the importance of his own suggestions. This is proper, but necessarily the relative value of the facts is obscured. In reality the principal factors which have been incriminated in the causes of nystagmus all have some importance, and help to create the fatigue and exhaustion which occasion the disturbance of the nervous system, particularly the visual centers, of which the ocular movements are the most evident symptom. I make the additional suggestion that dark adaptation is a function not only of the retina, but also of the cerebral centers, and as such may be especially affected by over-fatigue.

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IMPROVED METHOD FOR TOTAL ENUCLEATION OF EYEBALL.

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The operation here described aims at preserving the relations of the recti tendon with Tenon's capsule.

The operation of simple enucleation of the eyeball has been always considered an easy one, and frequently assigned to the resident. The general surgeon has felt that it was within his field of action. The result is usually a permanent deformity to the individual thus operated. To overcome this deformity, the operation has been modified by implantations of foreign bodies in Tenon's capsule or sclera, in various ways. A very ingenious method is that recently suggested by Dimitry. (A.J.O. v. 2, p. 653.)

The modifications that I now present were suggested by the fact that in ordinary tenotomy, we will say, of the internal rectus, if a free incision is made in Tenon's capsule after the separation of the internal rectus from the sclera, the result will be almost complete abolition of the movement inward of that eye.

The same thing is done to all the eye muscles and Tenon's capsule in the ordinary method of enucleation. This can be overcome by using catgut sutures thru the lateral muscles, attaching it to the Tenon's capsule of the opposite side, thus completely closing the space formerly occupied by the eyeball. Secondly: Tenon's capsule can be carefully separated so that practically none of Tenon's capsule is sacrificed, and consequently there is no tension, but quick healing. To do this it is necessary that the conjunctiva be primarily dissected loose from Ten-

on's capsule into the fornix. After the wound in Tenon's capsule is closed, the conjunctival wound is closed with catgut sutures at right angles to the opening in Tenon's capsule.

This allows the conjunctiva to seek its correct adhesion on the mobile Tenon's capsule, which latter is filled with a blood clot which probably organizes, and forms at least a temporary filling of Tenon's space, replacing the fat, tendon, glass or gold ball of implantation operations.

The advantages are:

1st. The full vitality and strength of the muscles of the eyeball are retained, giving movable socket with a minimum of retraction, or falling of the upper lid.

2nd. In addition to the excellent stump obtained, there is no violent reaction following this operation, as there often is in the gold ball implantation in the sclera.

3rd. There is no danger of extrusion or sympathetic ophthalmia, as there is at times in the implantation of a foreign body in Tenon's capsule.

4th. There is no after bleeding or secretion, and a welcome absence of the catarrh that so frequently follows an enucleation.

The improvements that I suggest are in the method of application of the catgut sutures to the recti and Tenon's capsule,—in the care to preserve entirely Tenon's capsule by separate dissection,—finally covering the same

with a separately detached conjunctiva.

I realize that it is difficult to suggest anything absolutely new in ophthalmic surgery, and others may have used this method of operating. The result is such a remarkable improvement that I beg to have you try it.

that the hook is perfectly free in that position.

A catgut thread 0 size (not chromicized), is threaded with three needles. The first needle is passed under the muscle to the opposite side, the second needle is passed thru the center of

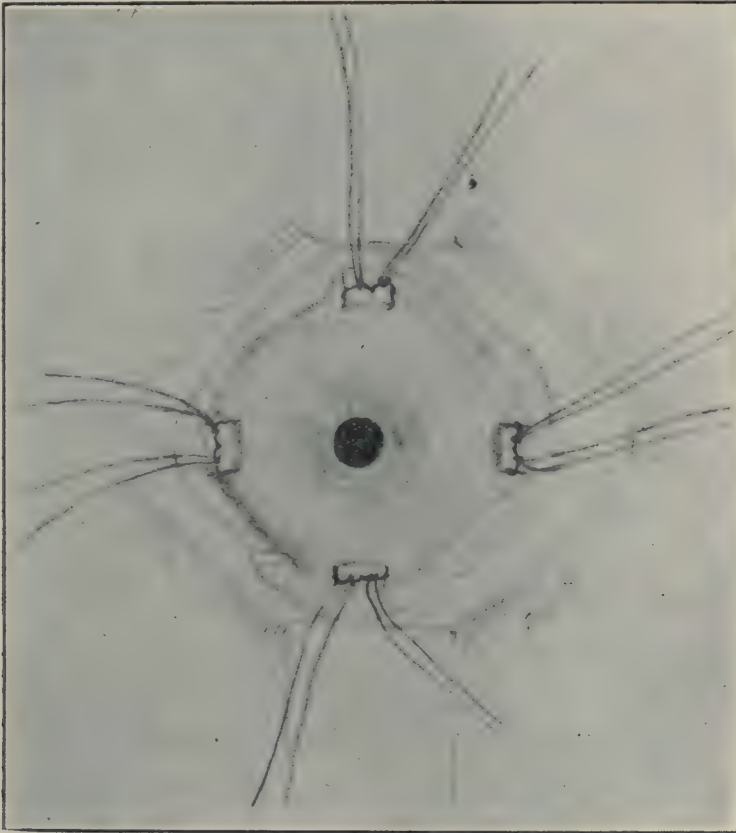


Fig. 1. Conjunctiva dissected from Tenon's capsule. Sutures placed in recti tendons and tendons divided.

OPERATION.

The patient is prepared in the routine way for ether operation. The local field is prepared to produce aseptic results according to custom.

After introduction of the eye speculum, the conjunctiva is carefully dissected from close to the cornea back into the fornix until it is entirely free from Tenon's capsule.

The internal rectus is caught upon a hook, Tenon's capsule slit parallel to the tendon close to its insertion, so

the muscle. The loop thus formed is cut close to this second needle. The ends are then tied over the upper and lower half of the muscle respectively, the end of the catgut being retained.

This preparation is similar to that usually taken in advancement operations of the muscles of the eye. The tendon is then cut close to the eyeball and the ends of the catgut caught by a hemostat, and placed out of the way. The recti muscles are all treated in the

same way, giving the result shown in Fig. 1.

The capsule of Tenon is still intact if care has been taken to dissect only the conjunctiva as advised. The capsule is then carefully separated from the eyeball by introduction of a curved

site side and tied, thus closing in the central part of Tenon's space containing the blood clot. The somewhat triangular spaces above and below these sutures are closed by the superior and inferior recti sutures, in the following manner:—The one catgut holding the

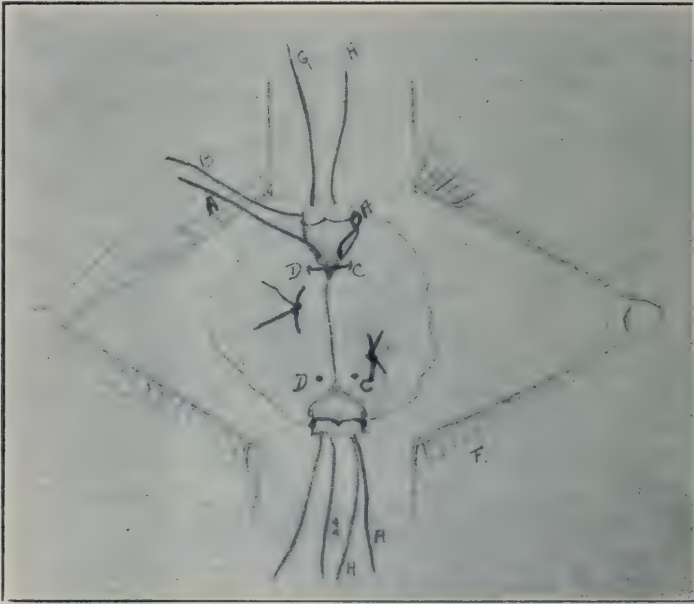


Fig. 2. After enucleation sutures from internus pass thru Tenon's capsule to temporal side and tied; sutures of externus pass thru Tenon's capsule to nasal side and tied. One thread from superior rectus starting at A is carried thru capsule from within outward at C, then, from without inward at D, and finally tied to B, after G and H are cut short, burying the end of this tendon. The inferior rectus tendon is to be treated the same way, the suture A to be carried beneath the capsule brought out at C, introduced again at D and brought from beneath the capsule to be tied to B.

pair of scissors, beginning at the insertion of the internal rectus, hugging the eyeball. After complete separation, the eyeball can be enucleated in the usual manner by cutting of the optic nerve.

After primary bleeding has ceased, under pressure, the Tenon's capsule is filled with a blood clot, and is readily outlined by tension on the sutures introduced thru the muscles. The wound is then sutured as follows: The catgut sutures of the internal rectus are passed thru the Tenon's capsule of the opposite side directly below the insertion of the externus and tied. The sutures of the externus are then passed thru the Tenon's capsule of the oppo-

superior rectus tendon is passed thru the neighboring capsule from within, out—then thru the capsule on the opposite side of this triangular space, and tied to another thread still attached to the superior rectus.

This forms a sort of purse string suture, completely closing the upper opening in Tenon's capsule. The same thing is done to close the lower opening. We then have a closed Tenon's capsule with the muscles in as nearly normal position as possible. The internus is given the preference in the attachment to Tenon's capsule as it is the strongest and has the most motion.

Finally the conjunctival wound is

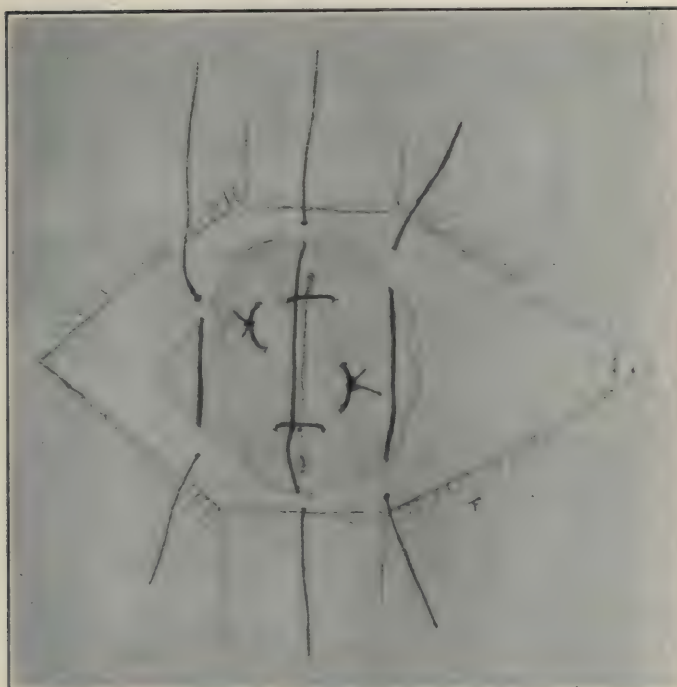


Fig. 3. Shows sutures tied, closing the capsule, and others placed for closing the conjunctiva.

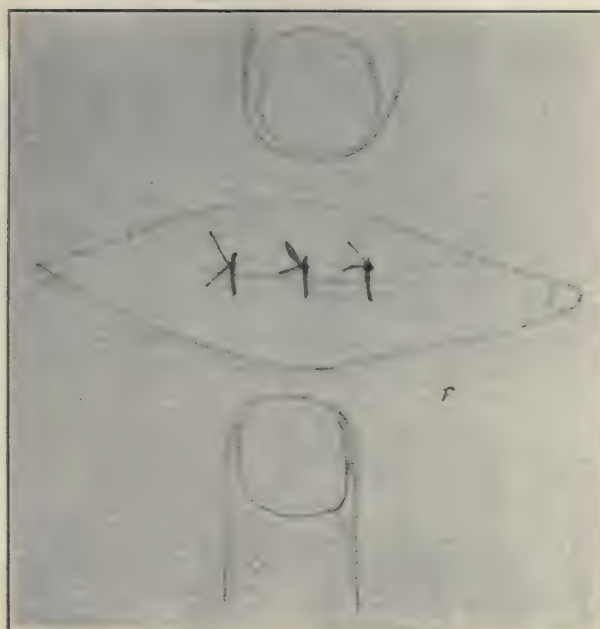


Fig. 4. The conjunctival sutures tied, completing the operation.

closed horizontally, burying Tenon's capsule. Both eyes are kept bandaged for forty-eight hours, as a precautionary measure.

The appearance of the socket after

this operation presents a clean surface with no granulating areas and no bleeding. Healing is by first intention with perfect motility, due to the normal attachments of the muscles.

EFFECT OF NOSE AND THROAT INFECTIONS UPON OCULAR FUNCTIONS OF AVIATORS.

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NEW YORK CITY.

OMAHA, NEBRASKA.

This report from the Medical Research Laboratory of the Third Aviation Instruction Center, A. E. F., deals with cases under the care of both the otological and the ophthalmological departments, showing the conditions encountered and the details of individual cases. Authority to publish granted by the office of the Surgeon-General.

In studying the results of operative interference in nose and throat infections, of thirty-eight (38) pilots at the 3rd Aviation Instruction Centre, A. E. F., it was found that many of the men who required operation by the Otological Department were diagnosed temporarily unfit to fly by the Ophthalmological Department. Therefore the eye records were examined to see if it were possible to answer the following questions:

1. How many pilots requiring operation by the Otological Department were under observation in the Ophthalmological Department? And what were the diagnoses in that department?

2. What relation existed between the nose and throat infections and the blind spots? If any change in blind spots was noted, what were the results of treatment?

3. Was vision affected and if so how was it influenced by treatment?

4. What was the effect of these infections upon the extra, and intraocular muscles? What results were obtained by treatment?

5. What did the history and physical examination of these pilots reveal?

Situated as we are, it has been impossible to refer to the literature, with the exception of part of the literature of aviation medicine; which, to our knowledge, does not deal with this subject.

The number of cases presented is small and the time of observation of necessity was short, but the apparent lack of literature on this subject in aviation medicine made us feel that a statement of our findings was justified.

1. In answer to the first question the following data were found:

Records of thirty-eight pilots treated by the Otological Department were found in the Ophthalmological Department. Nineteen or 50 per cent showed some ocular trouble, which possibly had infection of the nose and throat as the underlying cause. Search was made, by means of X-ray and laboratory examination in addition to physical examination, for other foci of infection. The ophthalmologic diagnoses were as follows:

Retrobulbar neuritis, six or 15.80%.

Convergence weakness, nine or 23.63%.

Divergence excess with convergence insufficiency, one or 2.63%.

Acute catarrhal conjunctivitis, one or 2.63%.

Marginal blepharitis one, or 2.63%.

Photophobia and lacrimation one, or 2.63%.

(Blind spots not examined in last case.)

2. Our second question is given the following answer:

Six, 15.80 per cent of the thirty-eight pilots showed definite enlargement of

one or both blind spots. The blind spots were examined by a rapid clinical method and compared with findings on the Bjerrum screen. The head was fixed in position by means of a tongue depressor mouth bite fixation, so that the cornea was 27 cm. from a 1 mm. black dot on a white or cream colored card, attached to the arc of a perimeter. One eye was covered, or binocular fixation was obtained, by using a metal cylinder placed on trial frame before one eye. The limits were determined by the use of a 2 mm. black test object on the end of a fine light colored steel rod, and outlined in pencil on the card. Résumé of the history of six pilots diagnosed Retrobulbar Neuritis:

1. R. C.

Referred from Nose and Throat Department Oct. 12, 1918.

Nose and Throat diagnosis—Deviated septum. Infection of sphenoidal and posterior ethmoidal sinuses (bilateral).

Eye examination: V. R. 20/15-4. V. L. 20/15-2.

Muscles: 6 meters:—Esophoria $1\frac{1}{2}^{\circ}$. Divergence 5° . Convergence 8° . 25 centimeters:—Exophoria 11° . Divergence 21° . Convergence 15° .

Chief complaint Photophobia.

Examination including central color vision, fields and fundi, normal except that the right pupil was 1 mm. larger than the left. Physical examination was negative except for a subacute bronchitis.

Oct. 18, 1918. Submucous resection of nasal septum.

Oct. 22, 1918. Enlarged blind spots.

Eye Diagnosis—Retrobulbar Neuritis (Bilateral). Convergence weakness.

Oct. 23, 1918. Convergence weakness shown by ergograph. To have converging exercises three times a week.

Oct. 26, 1918. Blind spots normal and convergence fatigue less marked.

Nov. 4, 1919. Convergence fatigue normal.

Nov. 8, 1918. Near point of convergence 60° 6 meters, Divergence 4° , Convergence 30° .

Results: Nasal, physical and ocular

conditions improved. Continued training as a pilot.

2. L. W. B. 2nd Lt. A. S. 24, Single. Oct. 8, 1918.

Chief complaints: Photophobia, dull pain back of eyes. Right eye vision blurs periodically. Smokes cigarettes. Does not drink. Denies venereal infection. Has had no trouble in flying.

Photophobia. Pain back of eyes and blurred vision for one month. Dilated right pupil noted one month ago.

Eye examination: V R. 20/40—1. L. =20/15—1. R.+0.75 cyl. ax. 90° =20/20—4. L. +25 cyl. ax. 90° 20/15.

N. P. C. 65 mm. N. P. A. both 105 mm. 6 Meters Ortho. 25 cm. Ex. 29° R.: Globe is tender and there is tenderness upon pressure back of globe Rt. pupil $4\frac{1}{2}$ mm. Left pupil $3\frac{1}{2}$ mm. Rt. reacts slightly to eserine. Rt. nerve slightly congested. Central color vision normal. Rt. blind spot greatly enlarged.

L.: Blind spot slightly enlarged.

Diagnosis: Retrobulbar Neuritis. (Bilateral.)

Ear: Negative. Nose: Chronic hyperplastic rhinitis. More marked on right side. Bilateral infection of the posterior ethmoidal and sphenoidal sinuses. Deviation of nasal septum. Throat: Chronic follicular tonsillitis. Teeth: Normal. Medical: Negative. Neurological: Negative. Laboratory: Negative.

Course and treatment: On Oct. 12, 1918, submucous resection of the nasal septum, followed by local treatment.

Oct. 21, 1918. Blind spots smaller.

Nov 17, 1918. Vision with correction. L. 20/15. R. 20/20—1. Rt. pupil still dilated. Photophobia. Rt. blind spot still slightly enlarged. Nose shows a marked improvement.

Results: Ocular improvement seemed to be in conjunction with nasal improvement.

3. T. R. 1st Lt. A. S. 25 yr. Single. Oct. 25, 1918.

Chief complaint: Referred because of many bad landings.

Previous history and habits: 15 cigarettes a day. Wine, no spirituous liquors, never to excess. Denies venereal

infection. Pneumonia eight years ago, no complications. Wears reading glasses occasionally. Otherwise eyes normal. Has had many poor landings. Had one crash from altitude 1,200 meters. Slight injury to back but able to keep on flying.

Present history: Feels well at present. Is nervous about landings. Eyes tire easily and ache at times.

Physical Examination:

Eye V. both 20/20—1. N. P. C. 40 mm. N. P. A. both 12 mm.

Muscles 6 Meters—Ex. 1°—Divergence 5°. Convergence 8° 25 cm. Ex. 3°. Divergence 15°. Convergence 16°.

Both blind spots somewhat enlarged. Left more than right.

Ocular examination including central color vision negative.

Diagnosis — Retrobulbar Neuritis. (Bilateral). Convergence weakness.

Ear: Negative.

Nose: Negative.

Throat: Large mass of adenoids—Septic tonsils.

Dental: Negative.

Medical: Negative.

Psychologic: Negative.

Neurologic: Negative.

Treatment and course:

Nov. 9, 1918. No improvement. Refused operation.

Results: Removed from flying and given ground position.

4. J. C. K. 2nd Lt. A. S. 23. Single. October 4, 1918.

Chief complaint—Constipation, nervousness, sleeps poorly, appetite poor, feels constantly fatigued, blurred vision and photophobia.

Past history: Three cups of coffee a day. No alcohol, no tobacco, never has had trouble with eyes.

Eye examination: R. 20/15+3.

L. 20/30—2. Refraction, homatropin, accepted plus .25 cyl. ax. 90° (but this did not improve vision).

Near Point Convergence 275 mm.

Near Point Accommodation R. 114 mm. L. 260 mm. 6 meters:—Divergence 4°, Convergence 6°.

Fundi normal. Central color vision normal. Fields contracted, more on the left.

Ear: Nerve deafness left ear.

Nose: Normal.

Throat: Considerable amount of pus expressed from both tonsils. Moderate mass of adenoids.

Dental: Negative.

Medical: Fatigued and nervous.

Neurologic: Negative.

Psychologic: Negative.

Laboratory: X-rays of head (two examinations) Negative.

Wassermann blood test negative. Spinal fluid negative.

Diagnosis: Retrobulbar Neuritis (Infectious).

Treatment: Adenoids and tonsils removed Oct. 10, 1918.

Complained of severe pain in eyes when tonsils were removed.

Both blind spots greatly enlarged after operation.

Septic clot in tonsillar fossa.

Converging exercises, and blind spots taken at regular intervals, showing no improvement. Blind spots greatly enlarged and out of proportion. No change in central color vision.

Dec. 31, 1918. V. R. 20/50—2. L. 20/50—2. N. P. C. 440 mm. N. P. A. R. 380 mm. L. 410 mm. 6 Meters:—Divergence 2°, Convergence 3°.

Fields contracted, left more than right. Blind spots greatly enlarged, left more than right. Retrobulbar tenderness, slight pallor of left optic disc; central color vision normal.

Ordered to the United States after this examination.

Result: Ocular condition worse. General health improved.

5. C. H. S. 2nd Lt. A. S. 24. Single. Oct. 30, 1918.

Wore glasses for a time for close work.

Smokes seven cigarettes a day.

Does not feel well. Headaches. Sleeps poorly.

Eye exam.: R. 20/10—2.

L. 20/10—1.

N. P. C. 350 mm. N. P. A. R. 100 mm. L. 105 mm.

Rt. blind spot slightly enlarged.

Diagnosis: Retrobulbar neuritis R.

Ear: Negative.

Nose: Acute empyema right antrum. (Cleared up in two days, with treatment of nose.)

Throat: Pus in both tonsils.

Dental: Negative.

Medical: Recovering from influenza.

Neurology: Negative.

Psychology: Negative.

Laboratory: X-ray shows cloudiness of right antrum.

Treatment: Tonsillectomy Nov. 5, 1918.

Nov. 15, 1918—Throat healed, feels better, headaches gone. Blind spots normal.

Results: 1. Ocular condition im-

Ear: Negative.

Nose: Negative.

Throat: Chronic tonsillitis.

Dental: Dental X-rays negative. Lower right wisdom tooth not fully erupted but not causing trouble.

Medical: Fainting spells.

Neurologic: Anxiety neurosis.

Laboratory: Negative.

Treatment:

Oct. 12, 1918: Tonsillectomy. Considerable edema in soft palate following operation.

Oct. 18, 1918: Rt. blind spot larger

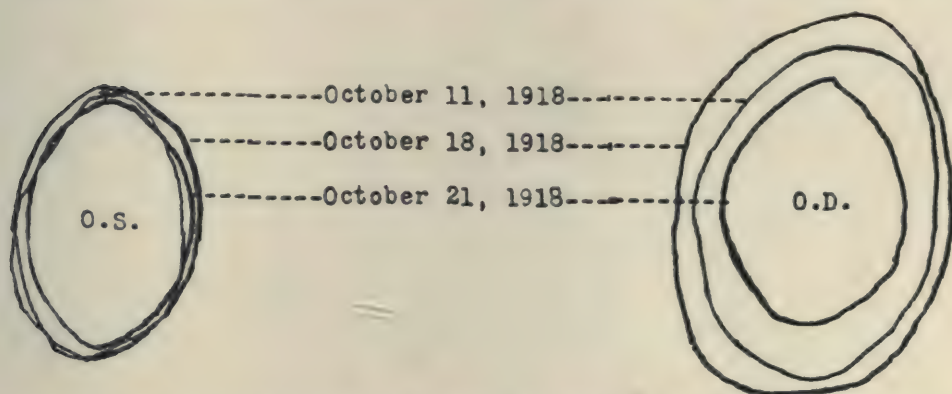


Fig. 1. The blind spots of the right and left eyes as recorded at successive dates by the rapid clinical method described above. Note increase in size of right blind spot following tonsillectomy; left blind spot also slightly enlarged at this time.

proved. 2. Physical condition improved.

6. R. G. W. 2nd. Lt. A S. 21, single. Oct. 3, 1918.

History:

Smokes ten cigarettes a day.

Wore glasses five years ago for study.

Feels sick most of the time. Fatigued constantly.

Eye: V. both 20/15—1, Pd. 65 mm.

Exam.: N. P. C. 55 mm. N. P. A. R. 115 mm. L. 115 mm. 6 meters:—Ex. 2°. Divergence 6°. Convergence 18°.

Muscles: 25 cm.: Ex. 14°. Divergence 20°. Convergence 40°.

Oct. 11, 1918: Right blind spot enlarged. Fig. 1.

Diagnosis: Retrobulbar congestion R.

Oct. 21, 1918: Throat healed. Blind spot normal. Headaches improved.

Result:

1. Ocular condition improved.

2. Headaches and general physical condition improved.

3. Class B. Anxiety neurosis.

CONCLUSIONS: 1. The blind spots are frequently enlarged in nose and throat infections seemingly before vision or other ocular functions are affected.

2. Repeated examinations of the blind spots in nose and throat infections give information as to the efficacy of treatment and often show the need for more radical measures.

3. Fliers who are receiving treatment for focal infection should have their blind spots examined routinely.

VISUAL ACUITY.

In answer to the third question concerning visual acuity our records revealed that two of the thirty-eight pilots with nose and throat infections had diminished visual acuity which could only be partially corrected by lenses. The case histories of these two officers appear in detail above. Case 2, L. W. B. and case 4, J. C. K. Both complained of periodic blurring of vision, photophobia, and pain back of eyes. The vision of one, L. W. B., was slightly improved and the size of the blind spots reduced by resection of the nasal septum followed by local nasal treatment. The vision of J. C. K. became worse and the blind spots larger, following tonsillectomy and adenectomy. The blurring of vision was very troublesome and at times made it difficult for them to judge distance in landing.

Conclusion 1. The periodic blurring of vision in nose and throat infections is sufficiently common to be the cause of an occasional crash.

Conclusion 2. Pilots suffering from nose and throat infections should not be permitted to fly, particularly when there is any enlargement of the blind spots.

In answer to the 4th question it was found that ten of the thirty-eight pilots with nose and throat infections had affections of extraocular muscles, divided as follows:

EXTRAOCULAR MUSCLES.

Convergence weakness, nine pilots. Only one case of the accommodative type of convergence insufficiency was encountered in the examination of 794 pilots. This was probably due to the fact that few of the fliers wore correcting lenses and uncorrected myopes were rare.

1. E.M.S. 2nd Lt. 21-3. Single. October 19, 1918.

C.C. Nauseated. Sick of air.

F. H. Negative.

P. E. H. Never has worn glasses nor has had any trouble with eyes.

H. P. T. Has cold in head.

Phys. Exam.: V. R. 20/15—4. L. 20/15—2. H. M. .62 S 20/15, Pd. 62 mm. N. P. A. 118 mm. H. M. .25 S 20/15 N.P.C. 105 mm. 102 mm.

Muscles: 6 M. Es. 1, Div. 6° Conv. 13°. 25 cm. Ex. 5, Div. 25° Conv. 35°.

Diagnosis: Convergence weakness.

Ear: Negative.

Nose: Acute rhinitis.

Throat: Pus in both tonsils.

Dental: Negative.

Medical: History of being sensitive to motion.

Neurology: Negative.

Psychology: Negative.

Laboratory: Negative.

Course and Operation: Tonsillectomy. Converging exercises.

Result: Improvement of converging power.

2. R. C. October 12, 1918.

History given under Case 1 R. C. in retrobulbar neuritis group. Nose and throat diagnosis; infection of posterior ethmoids and sphenoid sinus. Diagnosis: Convergence weakness. See Fig. No. 2.

Result: Converging power improved after resection of septum and converging exercises. Continued training as pilot.

3. W.C.A. 24-9. Single. October 8, 1918.

C. C. Tired out. Feels stale.

F. H. Negative.

P. M. H. Negative.

P. E. H. Negative.

H. P. I. Feels stale and tires easily.

Phys. exam.: Eye. V. R. 20/10—3 N.P.C. 65 mm. L. 20/15+4 N.P.A. 96 mm., 94 mm.

6 M.:—Ex. 2° Div. 8°, Conv. 16° 25 cm. Ex. 12°. Div. 22°, Convergence 27°.

Diagnosis:

Eye: Convergence weakness.

Aural and nasal: Negative.

Throat: Hypertrophied tonsils filled with pus.

Dental: Pyorrhea.

Medical: Negative except tonsils.

Neurologic: Negative.

Laboratory: Negative.

Course and operations: Tonsillectomy and exercises.

Result: Was permitted to fly but returned for converging exercises.

4. C.E.B. November 4, 1918.
 F.H. Negative.
 P.H. Chronic rheumatism (artic.).
 Tonsillitis in childhood.
 P.E.H. Eyes always good.
 H.P.I. No trouble.
 Phys. Exam; Eye: V. R. 20/15
 L. 20/15. N.P.C. 80 mm. Muscles 6 M.
 Ex. 2°, Div. 4°, Con. 7°. Blind spots
 normal.
 Diagnosis: Convergence weakness.
 Dec. 2, 1918.
 N.P.C. 65 mm. 6 M. 1½° Ex. Div.
 3° Conver. 9° 25 cm. Ex. 12° Div. 4°
 Conver. 11°.
 Ear: Negative.
 Nose: Negative.
 Throat: Septic tonsils—surface

Medical: Heart rapid after exercise
 (toxic).
 Course and Operation: Tonsillec-
 tomy.
 Result: Improved.
 Keen to continue flying.
 6. H.F.M. 27-3. Single. Septem-
 ber 27, 1918.
 C.C. Feels tired out.
 F.H. Negative.
 P.H. Negative.
 P.E.H. Wore glasses 1 year for
 reading when 8 years old.
 H.E.I. Feels nervous.
 Phys. Exam. Eyes: R. 20/15 N.P.C.
 49 mm. N.P.A. 98 mm. L. 20/15. 6 M.
 Div. 7° Conv. 8° 85 mm. 25 cm. Ex.
 10° Div. 12°, Con. 17°.

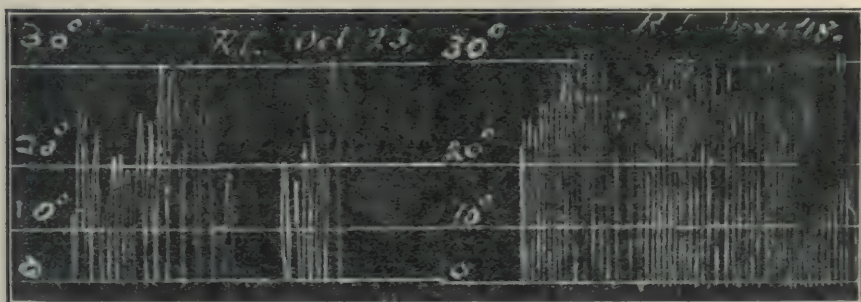


Fig. 2. Two records of the fatigue of convergence of Lt. R.C. are recorded by the modified Howe's ophthalmic ergograph. The time is recorded in ½ minutes. The horizontal lines correspond to ten, twenty and thirty prism degrees and are so marked. Note the increase in strength of the conver-
 gence power between October 23, 1918, and November 4, 1918.

burned by frequent applications of sil-
 ver nitrate.

Dental: Negative.
 Medical: History of tonsillitis and
 rheumatism.

Course and treatment: Operation,
 tonsillectomy.

Result: Improved—Class A.

5. J. W. C.

C.C; Lost feel of air.

F.H. Negative.

P.H. Negative.

P.M.H. Headaches.

P.E.H. Negative.

Phys. Exam: Eyes V: R. 20/15. 6 M.

Ortho. Div. 7°, Conv. 8°. L. 20/15

25 cm. Ex. 12° Div. 20°, Conv. 16°.

Diagnosis: Convergence weakness.

Ear: Negative.

Nose: Irregular septum.

Throat: Pus in both tonsils,

Diagnosis: Convergence weakness.

Ear: Negative.

Nose: Negative.

Throat: Chronic follicular tonsillitis.

Dental: Negative.

Medical: Tired out.

Neurology: Stale.

Course and operation: Tonsillectomy
 and converging exercises.

Result: Developed arthritis. Class
 B, Arthritis.

7. L.C.R. 22-10. Single. October 25,
 1918

C.C. Influenza.

F.H. Negative.

P.M.H. Children's diseases.

P.E.H. Negative. H.P.I. Headaches
 occasionally.

Phys. Exam. Eyes: V. R. 20/15

Pd. 70 mm. N.P.A. 125 mm. N.P.C. 90

mm. N.P.A. 125 mm. 6 M. Div. 5°,

Conv. 9°. 25 cm. Ex. 4° Div. 20°, Conv. 11°.

Diagnosis: Convergence weakness.

Ear: Negative.

Nose: Congestion.

Throat: Septic tonsils.

Dental: Negative.

Medical: Had influenza and now has acute rhinitis.

Course and treatment: Tonsillectomy and converging exercises. Dec. 2: Eye exam. No improvement.

N.P.C. 105 mm. 6 M. Ortho. Div. 4°. Converge. 9°. 25 cm. Ex. 13° Div. 20, Converge. 12.

Result: Much improved generally. Convergence weakness unimproved.

8. A.H.Y. 22-5. Single. October 3, 1918.

C.C. Negative.

F.H. Negative.

H.P.I. O.K.

Phys. Exam. Eye: V. R. 20/10—2 Pd. 63 N.P.A. 100 mm. L. 20/15—4 NPC 56 mm. N.P.A. 108 mm.

Diagnosis: Convergence weakness. 6 M. Ex. 1° Div. 4°, Conv. 16°. 25 cm. 17° Ex. 17° Div. 27°, Con. 36°.

Ear: Negative.

Nose: Deviation high up to right blocking drainage. Mucopus in nares.

Throat: Negative.

Dental: Negative.

Medical: Discharge from nose.

Laboratory X-ray: Frontal and antrum right.

Course and treatment: Antral puncture and irrigation. Pus in antrum. Pus in nasal slit after antrum cleaned. Converging exercises.

October 8, 1918: N.P.C. 35 mm 6 M Div. 4°, Converge. 35 mm. 25 cm. Div. 12°, Conv. 63°.

Result: Ocular condition improved. Removed from flying—Pansinuitis.

9. G.M.T. 22-6. Single. September 28, 1918.

C.C. Feeling of fullness in right ear and heaviness of right eye.

F.H. Negative.

P.H. Fatigues easily.

P.M.H. Diseases of childhood.

P.E.H. Wore glasses 2 years for reading. Granular lids before wearing glasses.

H.P.I. Eye troublesome since May. Chest trouble from pneumonia.

Phys. Exam. Eye: R. 20/10—1 H.M. +75s 20/10—1 Pd. 65 mm. NPA 100 mm. L. 20/15—1 H.M. +75s 20/15—1 NPC 84 mm. NPA 105 mm.

Diagnosis: Convergence Weakness. Hypermetropia. 6 M. Div. 5°, Conv. 8°. 25 cm. Ex. 17°, Div. 20°, Conv. 23°.

Diagnosis: Convergence Weakness. Hypermetropia.

6 M. Div. 5° Conv. 8°. 25 cm. Ex. 17° Div. 20°, Conv. 23°.

Ear: A. D. Chronic catarrhal otitis media—eustachian tube closed.

Nose: Deviation high up to right.

Throat: Pus in both tonsils.

Medical: Negative.

Course and treatment: Tonsillectomy—Converging exercises.

Oct. 18. N.P.C. 53 (Jerky) 6 M Divergence 5°, Convergence 12°. 25 cm. Divergence 16°, Convergence 32°.

Conclusion: Converging power improved. Hearing normal.

DIVERGENCE EXCESS CONVERGENCE INSUFFICIENCY.

1. G. S. H. Sgt. 21-8, Single.

Sept. 24, 1918.

C.C. Negative.

F.H. Negative.

P.M.H. Devitalized teeth but root canals filled.

P.E.H. Negative.

H.P.T. Negative.

Phys. Exam. Eyes: R. 20/20—4 R. +.50 \odot +0.62 cyl. ax. 100°=20/20. L. 20/20—2+.75 \odot +.25 cyl. ax. 90°=20/20.

H.M.R. .50s 20/15 Pd. 64 mm. N.P.A. 115 mm. L. .50s 20/15 N.P.C. 40 mm.

Diagnosis: Divergence excess with beginning convergence insufficiency. Ex. 2° 6 M. Div. 9°, Conv. 16°. 25 cm. Ex. 9°. Div. 25°, Conv. 25°.

Ear: Negative.

Nose: Negative.

Throat: Chronic tonsillitis.

Dental: Negative.

Medical: Negative.

Course and treatment: Oct. 4, 1918

—Tonsillectomy. Converging exercises.

Result: Improved.

INTRAOCULAR MUSCLES.

Only three of the thirty-eight pilots showed any affection of the intraocular muscles.

R.C. (Case one, retrobulbar neuritis). Rt. iris dilated. Accommodation unaffected.

L.W.B. (Case 2, retrobulbar neuritis). Rt. iris dilated (recent). Accommodation unaffected.

J.C.K. (Case 4, retrobulbar neuritis). Marked weakness of accommodation but irides unaffected. Accommodation weaker after tonsillectomy.

The near point of accommodation and convergence is measured in millimeters from the anterior surface of the cornea. This method has proven least confusing and permitted the accurate recording of small changes. If the wearing of lenses necessitated measuring from the anterior focus of the eye, 13mm. was taken from findings. Exercises for accommodation and convergence were given on Howe's Ophthalmic Ergograph modified for our purposes.

CONCLUSIONS.

1. Many of the pilots who showed little weakness of converging power as measured by the near point of convergence and prism converging power, showed rapid onset of fatigue when tested on the Ergograph. The same was true of accommodation, only fewer

men were examined for fatigue of accommodation.

2. Our experience leads us to believe that weakness and rapid onset of fatigue of the extra- and intraocular muscles is frequently associated with nose and throat infections and that this subject is worthy of further study.

3. Weakness in the converging power was often associated with bad landings. Whether this was due to derangement of binocular vision or to the general disturbance associated with the convergence weakness is a problem for further research.

The fifth question may be answered by giving a résumé of the histories and physical examinations of the thirty-eight pilots.

Twenty-eight had complaints of varying degree.

Six complained of cold in the head.

Six, of headache.

Two, of constipation.

Eleven felt tired out and were ambitionless.

One had stomach trouble.

Two complained of recurring attacks of tonsillitis.

Physical examination showed:

Four with bronchitis.

Six, tonsillitis, chronic.

Seven showed signs of staleness.

This entire subject needs thorough investigation by a group of medical men trained in aviation medicine, and if this paper brings forth constructive criticism and intelligent research, it will have served its purpose.

EYE LESIONS PRODUCED BY LIGHT RICH IN ULTRAVIOLET RAYS. SENILE CATARACT, SENILE DEGENERATION OF MACULA

J. VAN DER HOEVE,

LEYDEN, HOLLAND.

This paper reviews the observations made by its author and others, and the arguments that have been published bearing upon the influence of ultraviolet rays upon the eyes. He explains how light, falling upon the lens, may exert its unfavorable influence upon the ciliary processes, by the dispersion of short-wave light because the lens is optically heterogeneous; and brings out the point that senile cataract may have an influence in preventing pathologic changes in the macula.

Undue exposure to light, either natural or artificial, is a factor in the causation of many disorders of the eye. According to Hertel¹ every kind of ray can cause damage to the eye, if only the intensity is great enough. Of the different parts of the spectrum which can cause disease, the infrared rays have been least studied. Vogt² attributes to them the causation of glass workers' cataract. The visible rays are generally considered to be the cause of eclipse blindness. The effect of the ultraviolet rays on the eye is that which has been the most studied, especially in the last fifteen years.

In experiments it is very difficult to work with ultraviolet rays only, and exclude all others; but far more difficult to distinguish the effects in natural light of light rays and ultraviolet rays. Hence it is better to speak of light rich in ultraviolet rays, as Parsons³ does.

For literature on this subject the reader may be referred to the excellent reports of Hess⁴ and J. H. Parsons on the Affections of the Eye Produced by Undue Exposure to Light; and to Wagenmann⁵.

When we consult these authors as to the parts of the eye which may be damaged by exposure to light of short wave length, we find that scarcely any part of the eye is absolutely protected.

Not all the ultraviolet rays, which fall on the eye, are transmitted; the different media absorb a great part of them. Numerous experiments have been carried out to determine the absorptive capacity of the various structures of the eye for ultraviolet rays; and tho the results of Brücke⁶, Dond-

ders⁷ and von Reuss⁸, de Chardonnet⁹, Widmark¹⁰, Schulek¹¹, Hertel¹, Schanz and Stockhausen¹², Birch Hirschfeld¹³, Hallauer¹⁴, Vogt², Parsons⁴, and others are somewhat discordant, we know from them with certainty that the cornea and lens in particular partially absorb the ultraviolet rays.

Nearly all authors speak of the diminishing of rays in passing thru a medium as having been caused by absorption. This is not correct, there are other causes besides absorption that make the media partially impenetrable. We shall speak of this later.

HARMFUL LIGHT.

According to Parsons the researches on this subject by Martin are the most accurate hitherto published. Martin's¹⁵ experiments show us that the cornea absorbs all rays beyond 295μ completely and has no absorptive capacity of rays of greater wave-length; whereas the lens completely absorbs all rays beyond 350μ . The line is not a sharp one, absorption commencing about 400μ . Tho Parsons is very absolute on this point, one must bear in mind that experiments of Hallauer, Birch-Hirschfeld, Schanz and Stockhausen and others showed that the absorption of the lens has many individual differences; connected with eye, constitution, and other not exactly determined influences, thickness, color, and consistency of the lens.

Whereas there are lenses which beyond 400μ absorb completely, Hallauer found youthful lenses which transmitted rays of $310-330\mu$, and

Schanz a juvenile lens, which transmitted rays from 300μ upwards.

From these results, we know that, when ultraviolet rays fall on our eyes:

The surface is reached by rays of every possible wave length.

Iris and lens by rays from 295μ upwards, the retina as a rule only by rays from 350μ upwards; in some cases from 300μ , in others 400μ upwards.

To discover what damage light, rich in ultraviolet rays, causes to the different parts of the eye, we may follow two methods viz: to find from literature what affections of the human eye have been caused by such light, and to experiment on animals.

As a typical instance of the effect of natural light rich in ultraviolet rays on the human eye there is the well known snow-blindness. As sources of artificial light of this kind, which can damage the eye, arc lamps, mercury-vapor lamps, electric-welding, short circuit flashes are noted. The changes by lightning are generally attributed to other causes.

AFFECTIONS DUE TO LIGHT.

The first affection which human eyes suffer from natural and artificial sources of light rich in ultraviolet rays is photophthalmia, a name given by Parsons to these inflammatory conditions of the superficial part of the eye that are produced by exposure to various forms of bright light. In general, it is characterized by intense photophobia and lacrimation, with often blepharospasm and ciliary neuralgia. There is acute conjunctivitis and in the severest cases the cornea and iris may be implicated in the inflammation.

As a rule we attribute this inflammation of the superficial parts of the eye to the shorter waved radiation, whereas the affection of the inner eye is caused by the longer waved ultraviolet rays and the light rays. This difference is probably the cause of the two different kinds of snow-blindness, that we distinguish (Wagenmann): one with preponderance of the external diseases of the eye, the other with pre-

ponderance of the internal diseases of the eye, which may be found separate or together, according to the presence of ultraviolet rays of shorter or longer wave length or of both.

We find described caused by light sources rich in ultraviolet rays:

Photophobia, lacrimation, ciliary neuralgia.

Of the eyelids: erythema, spasm, edema.

Of the conjunctiva: changes of the epithelium, hyperemia, edema, chemosis, ecchymosis, injection, inflammation.

Of the cornea: haziness, opacities, infiltrations, ulcer.

Of the iris: hyperemia, change of color, pupillary contraction, inflammation.

Of the ciliary body: tenderness of the ciliary region.

Of the disc: hyperemia, inflammation, paleness of the temporal part.

Of the retina: scotoma, especially central scotoma, whitish spots at the macula, chorioretinal changes, constriction of retinal arteries, dilatation of the veins.

From experiments with light rich in ultraviolet rays, according to the publications of Widmark,¹⁰ Hess,⁴ Birch-Hirschfeld,¹³ Martin,¹⁵ etc., the same affections are found in animals.

Moreover Widmark, von Hess, and others observed in some animals slight opacity of the lens and microscopic changes in the anterior capsule cells; this lens damage was confined to the pupillary part of the lens. Birch-Hirschfeld found that the posterior layer of the iris could be seriously damaged and that the ciliary processes showed hyperemia, hemorrhages, swelling and desquamation of the epithelium, inflammation with fibrinous exudation in the anterior and posterior chambers. The inflammation of the eye was especially developed in the ciliary processes, the choroid showed hyperemia. In the retina Birch-Hirschfeld found degeneration especially when the eyes were aphakic. We see from all this, that nearly every part of the eye can be damaged by light rich in ultraviolet rays.

DANGEROUS EXPOSURES.

We know that in sunlight and in diffuse daylight many ultraviolet rays are present, especially those of a wave length between 300 and 400 μ . Moreover in the last twenty-five years the range of rays emitted by our artificial lights contains more ultraviolet rays than formerly. Consequently during the whole day, at least as long as our eyes are opened, they are irradiated by light rich in ultraviolet rays (sunlight, diffuse daylight, artificial light), therefore the fear is justified that this may damage our eyes.

We saw that sunlight and artificial light can in certain circumstances damage our eyes; how does it stand with diffuse daylight?

Hertel and Henker¹⁶ say diffuse daylight is innocuous to the eye. They write about "the undoubtedly innocuous daylight"; and they criticize Schanz and Stockhausen because they declare in a publication that snow-blindness is caused by daylight. Whereas according to Hertel and Henker, diffuse daylight, whether it comes from the light of the blue sky, or reflected from the clouds, or light which reaches us from a covered sky on dull days, cannot cause this affection. They consider as axiomatic, that diffuse daylight is innocuous.

This axiom, however, cannot be maintained, because Daland¹⁷ recorded in 1917 that the Eskimos on the coasts of Alaska, Siberia and the islands of the Bering Sea, and Arctic Oceans suffer very much from snow-blindness even on cloudy or dull days. "Many Alaskan pioneers have suffered snow-blindness by dispensing with goggles, under the conditions, believing that they were safe as long as the sun was hidden by clouds." One of Daland's conclusions is: "Snow-blindness occurs on cloudy days, on dark days, as well as on sunny days."

Even if it had not been found that diffuse daylight can cause snow-blindness, still we could not pretend with Vogt and Hertel and Henker that the ideal lights are those whose intensity is no stronger than the intensity of

diffuse daylight; and ideal goggles those that diminish the light so that the transmitted light is not brighter than diffuse lighted clouds. When in winter time the day lasts eight hours and we work eight hours longer by artificial light, even tho this light is not brighter than diffuse daylight, we expose our eyes twice as long to the light as nature meant us to do, and it is not impossible that a short exposure is not harmful to the eye, whereas prolonged exposure might be.

But the experience of the Eskimos is itself sufficient to prove that diffuse daylight may damage the eyes, so that light sources and goggles cannot be called ideal, which make the light equal to diffuse daylight.

If daylight can damage the eye, the next question is, which affections can be caused? Dr. D. Neuman of Nome, Alaska, found very often among Eskimos suffering from snow-blindness, chorio-retinitis, which according to Daland might be caused by the ultraviolet rays. The Eskimos, according to Daland, show conjunctivitis, cataract, trachoma and snow-blindness as "common ocular diseases." The conjunctivitis and snow-blindness may be caused by the ultraviolet rays; with regard to cataract it is an open question whether it can be caused by ultraviolet rays.

CAUSATION OF CATARACT.

The question whether senile cataract can be connected with the influence of daylight on the eyes is often raised and is a highly interesting point. In the newer literature we find several publications about this:

Hirschberg¹⁸ records in 1898 that in India senile cataract becomes mature about 20 years earlier than in Europe. Whereas in his clinic in Berlin cataract comes to operation on an average at the age of 62 years. He saw in the hospitals of Calcutta, Jaipore, Bombay, that Hindus were operated for senile cataract about the age of 46 years or some years later. Hirschberg attributes this early maturity of the cataract to the heat of

the sun; but of course it may just as well be attributed to the other rays of the sun. Against this experience of Hirschberg, Hess quotes Snell¹⁹, who, according to Hess writes on the authority of statistics given to him by Brockman, that in India cataract is not earlier than in Europe. When, however, we read Snell's paper itself, we see that he only writes, that the particulars given by Brockman hardly bear out the statement made by Hirschberg, but when we read Snell's article more carefully we can hardly agree even with this verdict.

Snell agrees with Hirschberg on the age of the cataract patients who come to operation in Europe: Hirschberg found in Germany an average of 62 years for senile cataract, Snell found about the same age, even in bottlemakers.

Brockman gave to Snell the following statistics about the age at which he operated cataract in India:

Age	Males	Females	Total
21 to 30	99	59	158
31 to 40	309	298	607
41 to 50	872	893	1765
51 to 60	1225	782	2007
61 to 70	503	168	671
	3008	2200	5208

We see most extractions were done at the age of 41-60 years on an average of about 50 years. Snell gives some figures about his own cataract extractions in England. When we compare Snell's figures to those of Brockman and omit the age of 21-30, because this cannot be reckoned as senile cataract, we find:

Brockman (India)			Snell (Sheffield)		
Age					
31-40	607	12%	47	9%	
41-50	1765	35%	67	13%	
51-60	2007	40%	159	31%	
61-70	671	13%	237	47%	
	5050		510		

We see, that in Snell's statistics the age of operation is in 78% between 51 and 70 years, by Brockman in 75% between 40 and 60. Whereas in Snell's statistics the decennium 61-70 contains

47 of the 78=60.25%, in Brockman's statistics the decennium 51-60 only 40 of the 75=53%; consequently we can draw from the two sets of statistics only this conclusion that in India, in the region where Brockman operated, senile cataract comes to operation more than 10 years earlier than in Sheffield. Snell tries to explain this fact by the earlier maturity and short lives of the Indian natives, but the fact remains that in India cataract is earlier than in Europe.

We see that Brockman's statistics verify the statement of Hirschberg, that in India cataract comes much earlier to operation than in Europe. Last year I found an article of T. J. Walter²⁰ of Florida in which the following passage appeared: "Cataracts are much more common the nearer the equator we go; and it has been proved that light is a factor in the production of this." I regret I could not obtain the paper in which Walter proves this fact (a paper read by the author before the Florida Medical Association 1915).

Hirschberg found in his clinic senile cataract much more frequent in country people at 50 years of age than in town people. Schwitzer²¹ found from 3674 cases of senile cataract, which were treated from 1875 to 1896 in the Budapest University Eye Hospital, that cataract appears most in country people, especially in the lower parts of Hungary. Schwitzer thought this fact proved that as Widmark could provoke lens opacities, by means of ultraviolet rays, so came cataract.

Birch-Hirschfeld points out, that Schwitzer quotes the literature badly and that he has no right at all to compare the opacities, which Widmark provoked, with senile cataract; because that is a quite different thing. Birch-Hirschfeld is quite right in this, but that does not diminish the value of the statistics of Schwitzer.

Schulek quotes very interesting figures of Grosz, who, according to Schulek in a pioneer article, showed in 1858 that in lower Hungary cataract was very frequent, especially among the people who worked in the

fields. In the regions where women worked in the fields just like the men, cataract was as frequent in women as in men, whereas in other regions where women did not do field work in the rays of the sun, and especially the ultraviolet rays, cataract is much more frequent among men than among women. Schulek comes to the conclusion, that light and especially ultraviolet rays are a prominent factor in the origin of cataract.

Against Schwitzer and Schulek, Birch-Hirschfeld says, and according to Hess he is right, that if ultraviolet rays cause cataract, people who live in high regions would have more cataract than other folk, and this as far as is known is not the case. This objection is not valid. Light certainly in the mountains contains more ultraviolet rays than in lower regions because the diffusion of light is less in the higher regions. But this increase of ultraviolet rays is greater for the rays of shorter wave-length, than for those of longer wave length; and we know that the first cause irritation of the eye and photophthalmia, so that the eyes must be kept more closed or be protected by goggles, in both cases the number of rays which reach the lens will be diminished.

Ascher²² found out in the University eye clinics of Prag and Strassburg that patients who had more cataract in one eye than in the other, had worked so that the light had influenced one eye more than the other.

When we consider the results of our inquiry into the literature on the subject, we see that whereas the opposition of Snell, Birch-Hirschfeld and Hess is not justified; Grosz²³, Hirschberg, Schwitzer, and Schulek found out that cataract is more common, and appears earlier in country people than in town people, in Hungary as well as in Germany; that according to Hirschberg and to Brockman, cataract maturity is 10 to 20 years earlier in India than in Germany and England; that Daland calls cataract a common ocular disease in Eskimos in the snow and ice fields of Alaska and Siberia; that according to Walter cataract is

much more common in America the nearer the equator we go, and that Asher was able to observe the influence of the position of the working lamp on the appearance and development of cataract.

If all this material came from the same part of the world, we might be tempted to think that diet, racial peculiarities, etc., were the cause of the earlier and more frequent appearance of cataract, but since these reports come from all parts of the world: Alaska, Siberia, India, Hungary, Berlin, Florida; these circumstances cannot be of great influence, and we look for a cause common to all these regions, and find it in the presence of more ultraviolet rays in the light of these regions than in others.

Hess, who thinks we have up to now insufficient evidence, to conclude that ordinary daylight damages the sound or diseased eye, writes moreover, "but from general biological motives—I could not readily conclude that in a living organ which has developed phylogenetically under the constant influence of daylight, the inconvenient peculiarity has developed itself of being seriously damaged by this same daylight." This is not a proof but a personal opinion to which I have some objections.

In the first place: What is daylight? In our part of the world it is mostly a diffuse relatively little reflected light; for the Eskimos it is a light very much reflected on the snow surface, sometimes sunlight, sometimes diffuse light; at the equator it is sunlight. The last mentioned lights can damage the eye seriously as we know from snow-blindness and sun-blindness.

Moreover, one of the chief reasons why an organ which develops under a certain influence will not be damaged by this influence is this that the individuals who have more sensitive organs will be less fit for life than the individuals with stronger organs, so that the latter will survive—"the survival of the fittest." For the origin of senile cataract, however, this is of no importance, because the cataract only appears at an age when the individuals

as a rule do not produce progeny any more, and when the working force is already diminished by other causes. Therefore a natural selection of individuals who are not apt to get cataract will not take place.

So tho we agree fully with Hess, that exact statistics composed from uniform points of view on the relative frequency of senile cataract in different countries will be of high interest, and will probably answer the question, we we must point out that the facts now known show plainly that senile cataract is more frequent and appears earlier in regions and countries which are more exposed to light rich in ultraviolet rays, and in people who expose themselves to this light.

We must always remember that even if light is a factor in the origin of cataract it is only one of a great many factors, which act on the whole organism or on the eye alone; that light is a principal factor in the origin of senile cataract is, however, rendered highly probable by the above mentioned facts. If this is true, the next question is: How is it possible that light, rich in ultraviolet rays, damages the lens so that senile cataract ensues?

HOW LIGHT ACTS.

In experiments by Widmark, Birch-Hirschfeld, von Hess, Martin, regarding the influence of ultraviolet rays, lenticular opacities were in some cases obtained with changes in the anterior capsule cells, the damaged area being restricted to the pupillary parts of the lens. In other experiments of Birch-Hirschfeld, Martin, Hertel, Ogneff²⁴, Strebel²⁵, could obtain no changes in the lens.

The opacities obtained have nothing to do with senile cataract, which almost never begins in the pupillary part. They only prove, that just like the epithelium of conjunctiva and cornea, the capsular epithelium too may be damaged directly by relatively short exposure to extremely strong light, rich in ultraviolet rays. Chardónnet and Widmark think that the exposed part

of the lens must suffer as a consequence of the absorption of so many rays.

Schanz²⁶ proposed the theory, that the albumin of the lens is changed by ultraviolet rays from easily soluble to less soluble, which change makes the lens opaque. He explains the fact that in senile cataract, the whole lens becomes opaque by the inner diffusion of rays in the lens. But even if this is possible the commencement of the opacity must, according to this theory, be in the pupillary part which we know is not as a rule the case in senile cataract.

Every attempt to explain the cause of senile lens opacity by the immediate influence of light, rich in ultraviolet rays, fails because those rays only reach the lens in the pupillary part of the lens, and the senile cataract does not begin at that place. Therefore for the explanation of the connection between senile cataract and lighting we have to accept next to the direct damage of the lens an indirect one. When we look for some cause of indirect injury of the lens our thoughts turn to the ciliary body on which the lens is dependent for its nutrition; very little disturbance of the ciliary processes only is necessary to cause changes in the lens.

In 1912²⁷ I put forward an hypothesis of how it is possible for the ciliary body to be damaged when the eye is exposed to light, especially when this is rich in ultraviolet rays; and stated the theory then that in such a way this light could cause senile cataract. That the ciliary body can be damaged and even seriously damaged by light, rich in ultraviolet rays, is a fact. In snow-blindness the ciliary region shows tenderness, when we touch it, and the patients suffer from severe ciliary neuralgia. In ophthalmia electrica we find the same symptoms, whereas in experiments on animals Birch-Hirschfeld found an inflammation of the ciliary processes, which was especially developed. He found desquamation and swelling of the epithelial cells, fibrinous exudation in anterior and posterior

chamber, hyperemia and hemorrhages in the processes.

Parsons,³ who experimented with Henderson and Martin, found with the delicate test which Römer²⁸ showed for disturbance of the fixation of the ciliary processes, that they became dis-



Fig. 1.

Fig. 1. Effect of search light in air free from dust, optically homogeneous.

turbed when the eye was exposed to light, rich in ultraviolet rays. If they exposed the eyes of immunized guinea pigs or rabbits, to the light of the uviolet or Kromayer mercury vapor lamp, they found that hemolysins were transmitted to the aqueous. Parsons (1913) concludes therefore that there is some reason to think that interference with the nutrition of the lens, thru the ciliary body by ultraviolet rays, may be a contributory cause in the genesis of glass workers' cataract.

So we see that by natural light, as well as by artificial light rich in ultraviolet rays, and in experiments with light of this kind the ciliary processes are damaged, but how is this possible? We know that the ciliary processes lie exceedingly well protected from the influence of light, from the anterior side by cornea and iris, from the exterior side by conjunctiva, sclerotic, the muscular part of the ciliary body, and the pigment layer. Even so well protected that Fuchs²⁹ declares: "The ciliary body is not reached by light." To explain a reason why it is possible that the ciliary processes are damaged by ultraviolet rays, I have to refer to re-

searches which I made in 1911 and 1912 on optical qualities of the lens. I showed then that the lens is optically heterogeneous not homogeneous.

THE LENS NOT HOMOGENEOUS.

We understand by the optical heterogeneity of a substance the fact that in this substance are present small particles, which when light falls upon them, become light sources themselves and disperse the light on all sides without changing the wave length of the light. As they are the particles of the substance itself but a kind of stain, we speak about substances which are optically homogeneous as optically pure or optically empty substances.

In the lens it seems a most illogical quality to be optically heterogeneous; not only because the diffused light is not used for the image on the retina but because it is also diffusely spread through the whole eye, so that the image in the retina may be blurred. It seems so irrational, that even well known physiologists consider it axiomatic that the lens is optically empty. Notwithstanding this, the lens is optically heterogeneous.



Fig. 2.

Fig. 2. Effect of searchlight when air is optically heterogeneous. Beam of rays revealed by light diffused in all directions.

Optically heterogeneity is known to every one, because in nature we find scarcely any substances which are optically homogeneous. It is best known by the fact that a sunbeam falling through a narrow slit into a dusty room can be seen from every side, be-

cause every particle on which the light falls, spreads the light on all sides, so that the track of the light is mapped out by the brilliant illumination of the dust or motes that are always present in a room.

If, for instance, the air was optically homogeneous, had no internal diffusion we would see of a searchlight only the light in the place where it is made, and the reflection of the light on objects which are illuminated by it. Compare for instance Fig. 1, where we see the searchlight and an aeroplane.

the light traverse the lens, in frontal (Fig. 5a) vertical (Fig. 5b) or sagittal (Fig. 5c) direction. Have we now the right to declare the lens is optically heterogeneous? No, because this luminescence can also be caused by fluorescence. To prove therefore that the lens is optically heterogeneous or homogeneous, we must distinguish fluorescent light from diffuse light.

As we know, fluorescence is the quality of a substance that every part of the substance becomes, if light falls on it, a source of light itself which



Fig. 3.

Fig. 4.

Fig. 3. Light passing thru homogeneous medium path not seen.

Fig. 4. Light passing thru heterogeneous medium showing its path, so-called Tyndall phenomenon.

The air, is however not at all optically homogeneous; therefore we do not see Fig 1, but Fig. 2; the whole track of the light in the air being mapped out as a luminous band, because every particle in it, disperses the light to every side. All the light effects in the air from searchlights, semaphores, etc., are caused by the optical heterogeneity of the air.

When we have to examine a substance for its homogeneity we send thru it a bundle of light-rays. When the sunshine itself remains dark (Fig. 3), we know it to be optically pure, homogeneous; if a luminescence appears (Fig. 4), it may be optically heterogeneous. This luminescence is called the Tyndall phenomenon in honor of its discoverer.

If we send thru an animal or human lens a bundle of light rays, we observe a very strong luminescence, independent of the direction in which we let

spreads the light on every side. In contrast to diffuse light the wave-length of the fluorescent light is different from the wave-length of the light which causes the fluorescence. Most substances follow Stoke's rule that the wave length is increased by fluorescence, some other substances on the contrary diminish the wave length of the light.

It is a well known fact that the lens shows a very strong fluorescence, which follows Stoke's rule and increases the wave length of ultraviolet, violet and blue rays to a whitish blue. Thence the luminescence in Fig. 5 will be at least partly caused by fluorescence. A great difference between diffuse light and fluorescent light is that diffused light is partly polarized, fluorescent light is always natural light, at least in substances which are not birefringent.

In certain circumstances as lens fi-

bres can be birefringent, therefore we have in the first place to decide whether the fluorescent light of the lens is natural or not. We can do this by causing fluorescence by means of dark rays. We can either take a Lehman's filter, which absorbs all the light rays and transmits only the ultraviolet rays, or we can divide the light by quarter prisms in its spectrums and

length of the sectors coming from the dispersing ball. The outer curves cut off from the sectors parts, which are proportional to the total radiation; the inner curves show in the same way the unpolarized radiation; the intermediate part of the sectors is proportional to the polarized radiation. The arrow indicates the direction of the incident light rays. When infinitely small par-

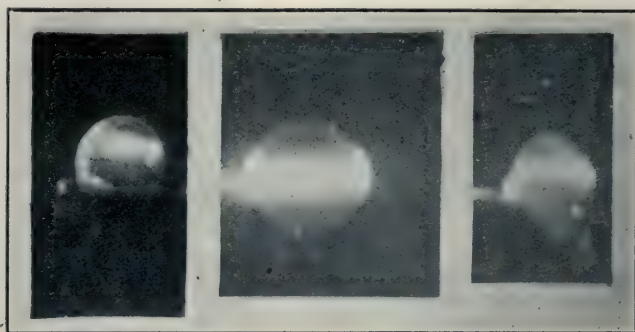


Fig. 5a.

Fig. 5b.

Fig. 5c.

Fig. 5. Beam of light passed thru crystalline lens in different directions. Its path is shown by the diffused light, proving that it is optically heterogeneous.

place the lens in pure ultraviolet. By one of these means the lens is traversed by ultraviolet rays only. If we now get a luminescence it is fluorescence only, because this has increased the wave length of the dark ultraviolet rays to light rays, whereas the diffusion leaves the wave length unchanged so that dark rays remain dark rays.

When now we examine this fluorescent light with a Nicol prism to see whether it is natural light or polarized, we find that the light is wholly natural. Thus we have proved that the fluorescent light of the lens is natural light.

Diffused light is much more complicated. According to G. Mie³⁰ the composition of diffused light varies in connection with the size of the particles which cause the diffusing. The Figures 6, 7, and 8 derived from Mie show the composition of the light dispersed by gold balls of infinitely small dimensions, from 160 to 180 $\mu\mu$ diameter.

In the figures the incident light is natural light, the intensity of the radiations is drawn in proportion to the

ticles are the cause of the dispersion we see in Fig. 6, that in a direction perpendicular to the incident light the diffused light is totally polarized. A Nicol prism can, when applied perpendicularly to the directions of the incident rays, extinguish the whole luminescence. By turning the Nicol perpendicular to this absolutely dark position, we see the Tyndall phenomenon in its

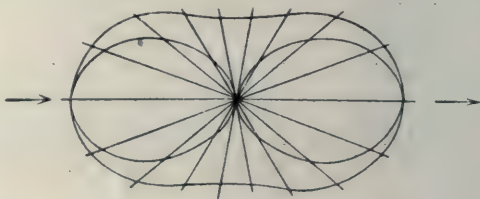


Fig. 6. Diagram explaining radiation by an infinitely small gold ball.

full strength; in every other position we find mixed light partly polarized, partly natural, except in the direction of the incident rays, where the whole light is natural as Fig. 6 plainly shows.

If bigger particles cause the luminescence, Fig. 7 and 8 show us, that in neither direction is the dis-

persed light totally polarized; therefore the Nicol will nowhere find a position in which it can totally extinguish the Tyndall phenomenon. The maximum of polarized light is to be found at an angle of 120° with the incident rays.

We now know that we can determine whether a luminescence is caused by fluorescence or by diffusion by examining the light phenomenon with a Nicol prism perpendicular to the incident rays.

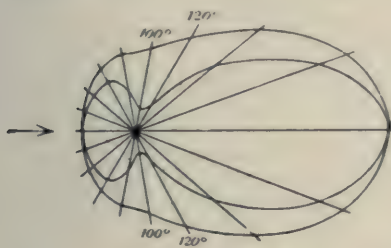


Fig. 7.

Fig. 7. Diagram showing radiation from a gold ball $160\ \mu\text{m}$ in diameter.

light in minimum and maximum positions by photometric examination; and in this way get an idea of the proportion of fluorescence—and diffused light. If, for instance, the minimum light were a quantity (a); the maximum (b); then a, the diffused b-a, if small particles caused the diffusion. If bigger particles did this the fluorescence would be less than a; the diffused light more than b-a.

In this manner I was able to prove in 1911, in the physiologic laboratory

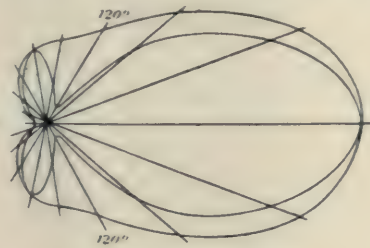


Fig. 8.

Fig. 8. Diagram showing radiation from a gold ball $180\ \mu\text{m}$ in diameter.

From this examination we have three possibilities:

1. The whole luminescence is fluorescence; then the light is wholly natural; in every direction of the Nicol the luminescence remains the same.

2. The luminescence is diffused light only; we now find, if it is caused by infinitely small particles a position of the Nicol prism in which the whole luminescence is extinguished, and by turning the Nicol the Tyndall phenomenon reappears; if bigger particles are present, we cannot find an absolutely dark position but the minimum and maximum of luminescence will show a considerable difference.

3. Fluorescence and diffusion are both present; we now find in a certain position of the Nicol prism a maximum of light, composed of fluorescence and diffused light; perpendicular to this position a minimum is found, which is fluorescence alone if small particles caused the diffusion or fluorescence, with a certain amount of diffused light when bigger particles did this.

In the lens the third case is present and we can compare the quantity of

of Professor Zwaardemaker in Utrecht that the lens of rabbits, guinea pigs, frogs, pigs, cows and calves show diffusion, are optically heterogeneous. The experiments were made in the following way: The light of a projection arc lamp was concentrated by quartz lenses and diaphragms, the animal lens was placed in the light bundle and the resultant luminescence was examined with a revolving Nicol prism placed perpendicular to the direction of the incident light bundle. With photometrically examined "London smoke" glasses, placed between Nicol and animal lens, tests were made, as to which density of "London smoke" glass was necessary to extinguish the luminescence totally, at maximum and at minimum luminescence. The proportion of the density of these "London smoke" glasses gave the proportion of the intensity of the maximum and minimum luminescence.

In the course of this research the diffused light proved to be always stronger than the fluorescence. When quartroptic was used, so that the fluorescence appeared as strong as possi-

ble the polarized light was still about two times stronger than the natural light. If optical glass was used, or even a solution of picric acid or Hallauer glass was placed between arc light and animal lens, so that the fluorescence was diminished greatly, the proportion of polarized light was much greater in many experiments. In a great number of lenses the proportion 31-1 was found.

As we saw above the natural light is either only fluorescence or even fluorescent light with somewhat diffused light, so we may conclude from the experiments that the diffused light is 2 to 31 times stronger than the fluorescent light. In this way the optic heterogeneity of the lens was sufficiently proved.

Another proof is that, if we exclude from the primary light bundle these rays which cause the fluorescence, the luminescence remains; this remaining luminescence is then diffused light only.

In this manner I proved in 1911 the internal diffusion of light in the lens, by excluding fluorescent rays with Hallauer glass, or picric acid solution; Schanz in 1913 by excluding those rays with euphos glass. Even if I interposed Hallauer glass No. 66 and No. 64 together both 2 mm. thick, glasses which absorb a considerable amount of light rays, the Tyndall phenomenon was still so strong that it could be easily photographed.

To this proof the objection may be raised that we can not know exactly if all the fluorescence is excluded so that the remaining luminescence can still be partly fluorescent light. Much more convincing is the proof if we examine the Tyndall phenomenon in pure spectral light. Dr. Zernicke, lecturer in physics at this university was so kind as to make these experiments with me.

The spectrum of a mercury vapor lamp, was divided into a range of rays, by a train of lenses and prisms made of quartz, and a part of an animal lens was held in the different rays. The luminescence which immediately ap-

peared was of different kinds in the various parts of the spectrum. In the ultraviolet rays, it was pure fluorescent light, and therefore natural light only; in violet and blue it was partly natural partly polarized; in yellow and red it was totally polarized. We were able to find a position of the revolving Nicol prism perpendicular to the incident rays in which the luminescence was absolutely extinguished. This last fact proves not only the presence of the heterogeneity of the lens, but also that the cause of this diffusion is small particles, because otherwise the extinction would not have been absolute in any direction. (Figs. 7 and 8).

The best proof of the heterogeneity of a substance is the direct observation of the small particles themselves. We know that with the method of examination which is called the dark field illumination we can see submicrons of 200 to 6μ diameter which cannot be seen with our ordinary microscopic examination. If we examine animal lenses in this way we see immediately the well known glittering points many of which move rapidly (Brown's molecular movements).

Against all the proofs here described one objection may be raised, that all are executed on dead lenses; so that it is not impossible that post-mortem changes are the cause of the optical heterogeneity, as for instance is the case in chromocytes 1. To prevent this I used material as fresh as possible, absolutely fresh lenses of frogs, guinea pigs, rabbits, etc., and of a child whose normal eye had to be enucleated for a sarcoma. In every case I was able to prove by the dark field, as well as with the Tyndall phenomenon, the optical heterogeneity.

Moreover, I examined the lens in living people and animals. If we throw concentrated light into a human eye with dilated pupil at an angle of 45° with the fixation line we see immediately the luminescence in cornea and lens not in the anterior chamber.

With a Nicol prism perpendicular to the incident rays, and consequently also at an angle of 45° with the

fixation line, we can examine whether the luminescence is natural light or partly polarized. With the photometrically tested "London smoke" glasses we can again fix the properties of natural and polarized light.

It is not necessary for this examination to use intensive lights such as arc lamps, our common ophthalmoscope lamps alone are quite sufficient; for instance a lamp of 16 candle-power with a frosted glass by concentration of the light with a lens of 20 D. gives a very distinct luminescence of the animal lens.

From this examination in living people we get the same result the diffused light in the lens is much stronger than the fluorescent light. We must, however, remember about the fact that a mistake may be made in this way because it is very difficult to avoid reflection of the light and reflected light is often polarized so that the amount of polarized light is not all diffused light and hence the proportions found with "London smoke" glasses do not give the difference between the two kinds of light exactly; therefore we cannot use the figures found in this way. The difference, however, is so great that we can declare absolutely that the lens in the living eye of man and animals is optically heterogeneous.

The luminescence which we observe in every human and animal lens, which is traversed by light rays, is not only fluorescent light but partly diffused light, because:

1. In the dark field we see dispersing particles.
2. The luminescence is for the most part polarized light.
3. The luminescence remains if we exclude the rays which cause fluorescence.

Thus we have proved that:

The animal and human lens is not optically pure but is optically heterogeneous.

VALUE OF DIFFUSION.

If we are thoroughly convinced of this fact, we ask what is the reason of the

presence of such an illogical appearance as optical heterogeneity of the eye lens? A fact which robs not only the image on the retina of a part of its light but which spreads also diffuse light all over the retina. The answer to this question is that the heterogeneity of the lens like the fluorescence can be a protection of the retina against ultraviolet rays. How is this possible?

If all kinds of rays of the spectrum were diffused in the same measure, then exclusion of all ultraviolet rays from the retina by diffusion would imply exclusion of all light rays from the retina too, so that no light would be observed. The diffusion is, however, not equal for all rays; but is, if caused by small particles, according to the law of Rayleigh, proportional in inverse ratio to the fourth power of the wave length. If the wave length of just visible violet is $400\mu\mu$, of just visible red $800\mu\mu$ then the diffusion of this violet is $800/400$ to the fourth power $=16$ times stronger than that of the red; and if we could radiate the lens with ultraviolet of $200\mu\mu$ wave length, the diffusion would be $(800/200)^4=256$ times stronger than the diffusion of this red light.

For the ultraviolet rays from $300-400\mu\mu$ wave length which pass the cornea, the diffusion is about 3 to 1 times stronger than the diffusion of the just visible red and so we have in this diffusion an excellent method to keep many ultraviolet rays away from the retina and to let the light rays pass.

We are acquainted with this peculiar way of diffusion very well in nature; the same sun which at noontime sends his rays perpendicular to the earth sends yellowish white light because the rays traverse the atmosphere only over a relatively short distance. But in the evening when the sun sets, the rays have to cut the atmosphere over a much greater distance. In this atmosphere diffusion takes place to such a measure that many of the violet and blue rays are scattered; and only the rays of greater wave length remain nearly undisturbed so that it is chiefly the red rays that reach us and we see

the sun as a red ball. The dispersed violet and blue rays are the cause of the blue color of the sky which without this diffusion would be absolutely black.

In the eyes we often see the same phenomenon. If great opacities of the vitreous are present which diffuse the light, the disc may seem hyperemic tho in point of fact it is quite normal. The lens disperses the rays in the same way, with the consequence that the visible rays pass nearly undisturbed whereas the ultraviolet rays are scattered on all sides. In this way we can state the optical heterogeneity of the lens to be a protection of the retina against undue influence from rays of shorter wave length. In returning to the open question why the ciliary processes can be damaged by light rich in ultraviolet rays, we can now by means of the optical heterogeneity of the lens give an answer.

In the lens the greatest diffusion of light will take place in the anterior part because many of the ultraviolet rays will not even reach the posterior part. If we regard the position of the lens in the eye and ask whither the diffusely dispersed rays will go, then we see that a great part will reenter the anterior chamber by the pupil, another part will irradiate the posterior layer of the iris, a third part will go sideways to the processes ciliares, a small part to the anterior portions of the retina and choroid, or even spread diffusely over the whole retina.

CILIARY BODY AND CATARACT.

The third part strikes the ciliary processes at their most vulnerable point, the fully unprotected epithelium. We saw in Fig. 5c, that, if the lens is traversed by light in its sagittal axis a considerable amount of light is diffused sideways, that is, in the direction of the ciliary processes. Now we must bear in mind that a much greater part of dark ultraviolet rays, is thrown in the same direction; so that by the optical heterogeneity of the lens the ciliary processes are illuminated by light very rich in ultraviolet rays. This fact can have as a consequence that if intense light strikes

the eye as was the case in the experiment of Birch-Hirschfeld, the ciliary processes may be seriously damaged; as Birch-Hirschfeld observed desquamation and swelling of the epithelial cells, hyperemia, hemorrhages, fibrinous exudation in anterior and posterior chamber. The posterior layer of the iris is struck by more rays than the ciliary processes, but it is far less vulnerable. Notwithstanding, Birch-Hirschfeld observed distinct damage of this layer and even the anterior part of the choroid was very hyperemic.

Thus optical heterogeneity can explain how the ciliary body, tho well hidden, becomes inflamed; and how the pain may arise in snow-blindness and ophthalmia electrica, on touching the ciliary regions; and perhaps it is also responsible for the ciliary neuralgia which bothers the patients so much.

If the ultraviolet rays are less in number and the light which strikes our eye is not so intense, as, for instance, daylight and the artificial light we use, no inflammation will occur; but the continual everlasting radiation of the few ultraviolet rays on the ciliary processes, will be able in the lapse of years to cause small changes in the epithelial cells, so that the secretion is changed a little. Even a very trifling alteration of the aqueous is sufficient to cause malnutrition of the lens; which may, in the course of fifty years and more, lead to obscuration of the lens, to senile cataract.

The above mentioned experiments of Parsons, Henderson and Martin proved that the secretion of aqueous by the ciliary epithelium can be interfered with by radiation with light rich in ultraviolet rays. Peters³¹ established the theory that many cataracts find their origin in small changes of the ciliary epithelium, so that the secretions and consequently the osmotic pressure of the aqueous is altered. In many cases he could find by microscopic examination lesions of the ciliary epithelium. I believe, that changes of the ciliary epithelium, requisite to alter the secretion of aqueous so that senile cataract ensues, may be so small that it is not possible to find them in every case of senile cataract, even by careful microscopic examination. It is possible that

the changes are so small that they escape our examination but are sufficient to change the aqueous humor and the nutrition of the lens.

In this way we can explain the acute inflammation of the apparently well protected ciliary processes by irradiation of light rich in ultraviolet rays, the senile cataract, the observations of Hirschberg, Grosz, Schwitzer, Schulek, Daland, Walter, Ascher, etc., that senile cataract is more frequent and comes earlier in regions and countries which are more exposed to light rich in ultraviolet rays, and in people who expose themselves more than others to such light. Until now every theory that attempted to explain the connection between radiation and senile cataract went astray, because the rays work on the pupillary part of the lens (where they can cause opacities and epithelial changes), whereas senile cataract begins as a rule in the periphery.

Schanz, who established the theory that the ultraviolet rays change the soluble albumins of the lens into less soluble ones, and cause in this way opacities, uses the internal diffusion to explain how the whole lens can become obscured. But even when this is granted it is not yet explained why the senile cataract does not begin in the pupillary part of the lens, which in this theory must also be the case. In my theory the cataract may begin anywhere in the lens where the malnutrition of the lens has the greatest influence or where a locus minoris resistentiae is present.

If the lens diffuses light it is not the ciliary processes which get the most of the ultraviolet rays; the inner layer of the iris will get more and the pupillary part of the iris will get most; this is directly struck by the incident rays, and from behind by the rays reflected by the lens, and by those which the lens diffuses; whereas the posterior layer of the iris only gets diffused rays.

When the diffusion of the lens is so strong that cataract ensues, it is probable that the pupillary part of the iris, and perhaps even the posterior layer of the iris will suffer too, from the radiation of rays of short wave length, tho they are much more resistant than the ciliary epithelium.

Have we any evidence in literature about the alteration of the iris in cataractous eyes? Yes, Lindberg³² found that in eyes with senile cataract, at the pupillary border depigmentations and gaps were very often to be found. This is not a casual coincidence, nor are they both senile symptoms, for those same alterations at the pupillary border cannot be found in old people without cataract.

Hence there is according to Lindberg a connection between senile cataract and pupillary alterations. He was unable to examine sufficient patients giving useful results with diasclelral transillumination, to decide whether there is also such a connection between affection of the posterior layer of the iris and senile cataract; but most of the cases which he examined showed such a connection plainly. We see that the observations of Lindberg give just what we should expect if the theory above established is right.

SENILE DEGENERATION OF THE MACULA.

If the diffusion of light in the lens is really a protection for the retina against ultraviolet rays then the lens which protects the retina best will get cataract. The lens which does not diffuse light will not protect the retina, but will remain healthy itself because the ciliary processes do not become afflicted.

As we know from the observations of Hallauer, Schanz, Birch-Hirschfeld and others, the transmission of ultraviolet rays thru the lens is individually very different; so that some lenses let the greater part of ultraviolet rays which crossed the cornea pass to the retina. Hence we ask, is any affection of the retina known which can be due to the ultraviolet rays, and can be compared to the senile cataract? I think we have such an affection in the senile degeneration of the macula lutea, an affection which appears as a rule after sixty years and becomes more frequent the older people are.

It is no wonder that the macula should be affected most because when light falls into the eye the macula is usually one of the most illumined parts. The macula as the highest organized part, is also the most vulnerable, and moreover, it is the least protected part.

According to Birch-Hirschfeld the inner layers of the retina diffuse the ultraviolet rays and can be damaged by them. They protect the outer layers. In the macula the inner layers are few and thin, so that the cones and rods are nearly unprotected by them, and can be damaged by the ultraviolet rays.

We saw that in undue reception of light rich in ultraviolet rays the macula was often afflicted, (Central scotomata, white and whitish spots in the macular region, by artificial light sources as well as by natural light).

If the supposition that senile macular degeneration is a consequence of ultraviolet rays is right; the degeneration ought to be found in old people without cataract. For, as we saw, the lenses which get cataract in consequence of their diffusion of rays protect the retina, whereas the lenses which let the rays pass so that the retina gets affected remain clear. Consequently there must be an opposition between senile cataract and senile macular degeneration. If one of them is present the other must be absent or very much less developed whereas if both were pure senile symptoms they must appear nearly always in the same eye. How is this in human eyes?

In my Groningen clinic I had a good opportunity of studying these proportions thoroly, because senile macular degeneration is with us a very common affection. In the four years from 1916 to 1920 I found among 16,602 eye patients in my ambulatory, 1,336 of an age beyond sixty years. 1,788 of them suffered from macular degeneration. The affection was found in patients from 61 to 70 years in 6.125%, in patients from 71 to 80 years in 23.06%, and in patients beyond 80 years even in 30%.

The visual acuity was always greatly diminished tho the ophthalmoscopic changes were usually small. As to cataract I have never found a degeneration of the macula directly after the extraction of senile cataract, and in the records of about 500 cataracts operated on in the last 20 years in this clinic, I have not found one case either.

In textbooks of ophthalmology the presence of a macular degeneration after cataract extraction is always described

as a very disagreeable but rare occurrence. If both were real senile symptoms, this occurrence would be, on the contrary, very frequent.

Among my patients with macular degeneration we have by very careful examination found, with pupil dilated to the utmost, lens opacities in 44% in patients of more than sixty years of age, in 47.3% in patients of more than sixty-nine years of age. Whereas we found lens opacities in 90% in patients of more than ninety years of age, without macular degeneration, in more than 80% of those older than sixty-nine years, just like Barth and Vogt, and according to Hirschberg and Hess. The latter writes that by careful examination of the lenses of people older than sixty years the absence of any opacity is even rather rare.

Thus we see that in our patients cataract appears only in half the number of the cases if macular degeneration is present, that it does if there is no macular degeneration. If we consider, moreover, the fact that the opacities in patients with macular degeneration were always very few and small, whereas in other patients the opacities varied from very small to mature cataract, we come to the conclusion that a very pronounced opposition between senile cataract and senile macular degeneration is observable.

I may add to this that the research on the macular degeneration and cataract frequency, was done quite apart from the theory above mentioned. The contrast of the two eye conditions was found out in the clinic, before the theory was developed as far as this. So that the eye surgeons who made this research were not under suggestion of what had to be found out; afterwards the result of the research was put in connection with the theory. We see that this result also is what we should have to expect if the theory of the influence of the light diffusion by the lens is right.

According to the more or less strong heterogeneity of the lens and the resistance of ciliary processes and retina to ultraviolet rays we get four possibilities.

1. The lens diffuses the light very much, the retina remains unaffected,

the ciliary processes are struck by the rays, and consequently the lens becomes obscured. This seems with human beings the usual case, as beyond sixty years 90% show opacities.

2. The lens lets all rays pass, remains clear but the retina may get diseased.

3. The lens diffuses so much that it gets obscured but lets so much pass that the retina too gets affected.

4. The ideal lens which seems to be very rare, diffuses so that the lens as well as the retina remain unaffected.

Now-a-days ultraviolet radiation is being used as therapeutic agent for corneal disease in Uthoff's clinic by Chotzen and Kuznitki³³. The radiation was always performed at the upper corneal border, not before the pupil. One of the consequences of the radiation was circumscribed depigmentation of the iris at the place where the radiation was performed. The results were good.

The risk of damaging the eye is not great, because the radiation time was very short, i. e., 5 to 15 minutes. In this time a Kromayer's mercury vapor lamp such as was used, will not do much harm to the eye, especially when the precaution is taken not to work in the pupillary part. But I think that even if it was radiated in the center of the cornea not much harm would ensue in so short a time.

PROTECTION FROM LIGHT.

If the proposed theory is right, it is a question whether we ought to protect our eyes from this undue effect of light rich in ultraviolet rays in order to prevent our getting cataract or macular degeneration in old age.

Sometime ago, when the possible effect of ultraviolet rays was very much over-rated it was proposed to make our windows of protecting yellow-green glass, to cover every artificial light with them and to wear goggles. Now-a-days, nobody, I think, will be so afraid of those rays as to condemn people continually to wear protecting goggles; and I think also that it is not at

all necessary to protect our eyes continually. We must remember that to cause one of the above mentioned senile affections those continually working under such rays need fifty or more years; so that a little protection will be sufficient to bring about that those affections do not show themselves dangerously in our lifetime.

Normal people, for instance, might wear one of the protecting kinds of goggles, only when they are more than usually exposed to ultraviolet rays, e. g., on sunny days at the shore, or on the river, or on strongly reflecting roads and places on ice and snowfields, in hunting in the fields, etc. People who have to labor continually in the vicinity of lamps which irradiate many ultraviolet rays will do well to cover the light with one of the protecting glasses.

Quite another question is it for people such as astigmics, myopes, etc., who are already obliged to wear spectacles. Though they are already a little protected by the usual glasses, it would be but little disagreeable to them to have their glasses a trifle tinted as Hallauer. This is not ugly; it does not discolor the objects one sees, and as we know from hunters, it makes vision rather better than worse, so that there is no reason to refuse a protection which will be enough to prevent the undue effect of ultraviolet rays.

In all this we must remember that tho we may be convinced that light rich in ultraviolet rays is a principal factor in the origin of cataract and retinal degeneration, it is only one of the numerous factors which may have an influence on the origin of these diseases. That senile cataract proves to be often hereditary (Vogt)², does not contradict our theory; because the heterogeneity of the lens, which so differs in individuals may be hereditary more in one family than in another.

SUMMARY.

1. The lens is optically heterogeneous.
2. Ultraviolet rays may seriously

damage the retina and the ciliary processes as well by natural light (snow blindness) as in artificial light or in experiments.

3. Senile cataract and senile degeneration of the macula exclude each other in a certain measure; if one of those affections is present the other is absent or less developed.

It is probable that

1. The damage of the ciliary processes by light rich in ultraviolet rays is caused by the optical heterogeneity of the lens; which disperses a part of the rays and especially the ultraviolet

to the ciliary processes and in other directions.

2. A principal cause of the origin of senile cataract is the influence of light rich in ultraviolet rays, such as daylight; which causes the opacity by interfering with the nutrition of the lens, in damaging the ciliary processes by rays dispersed against their epithelium.

3. One of the principal causes for the appearance of senile macular degeneration is the influence of light rich in ultraviolet rays which has passed the lens.

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NASAL INFECTION THE BASIS OF CERTAIN OCULAR LESIONS.

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This paper, opening a discussion upon the subject, emphasizes the need of close cooperation by ophthalmologist and rhinologist to secure a complete clinical picture of the case. It outlines a classification of such cases. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology, August 5, 1919.

In presenting this paper I bring before you a subject which is comparatively new; but which has been investigated with unusual thoroughness by quite a number of very able men, largely ophthalmologists.

I have very little to add to what has already been written but the subject is one of such importance that I think it well for us to discuss it in our meetings frequently. There is probably no group of lesions which more intimately concern the ophthalmologists and laryngologists and which are of such serious importance to the patient. This close cooperation and coordination is all the more essential to success, in that the diagnosis often has to be made on very meager findings which might be easily overlooked. Even a condition of such severity as to cause a retrobulbar optic neuritis, when due to an acute streptococcus infection, may show such slight symptoms in the nose as to be extremely difficult to detect. This is all the more true as the roentgenogram usually fails to give any indication of infection and leads to a false diagnosis if depended upon.

By this I do not mean to say that I do not believe in the use of the roentgenogram, I do use it always; but I have come to know its limitations. It is very valuable to show the size and position of sinuses and of pus in them when it is thick and opaque.

As oto-rhinologist in association with Drs. Gifford and Patton, searching the nose and adjacent structures for the underlying cause of these ocular manifestations, I have come to the conclusion that it is very essential for a rhinologist to have the history, etiology, physical findings and diagnosis from the oculist, as many conditions in the nose which could be passed as normal under ordinary circumstances become

pathologic when associated with certain manifestations.

As an illustration, suppose Dr. A., oculist, refers to Dr. B., the rhinologist, a patient with a note stating, Mr. C. partial blindness of right eye or O, second, Mr. C. vision of right eye failing for past three days; pain over right temple. Vision right eye 20/100, left eye 20/20; blind spot enlarged; concentric contraction of field for form and color, as shown by diagram; ophthalmoscopic findings, normal. Diagnosis, probably retrobulbar optic neuritis. By comparison of the former statement, it is easy to see that while the first may be almost any disease to which the eye is subject, and hence leaves a very wide scope for investigation, the latter confines the disease to a definite portion of the optic nerve, and at the same time brings the search for its cause within quite restricted limits. With the above findings any deviation from the normal of the posterior ethmoid, sphenoid, or contiguous structure is most important, even tho they be so slight as to be ordinarily of not much significance.

The great importance of such a report with the case is that it gives to the rhinologist a basis to apply the facts brought out by the different workers in this field. Onodi in demonstrating the relationship of the optic nerve to the sphenoid and posterior ethmoid cells; Posey, Brawley, Loeb, Bryan, and others for the role played by the accessory sinuses. Parker, Patton, Louis Zeigler, and their studies demonstrating the relationship of blepharospasm, photophobia, blepharitis, epiphora, superficial corneal ulcers and reflex ocular disturbances, to a pinched middle turbinate or impinging spur, and Risley, Reber, Knapp, deSchweinitz, MacWhinnie, Parker, and others,

on the perimetric findings associated with diseases of the sinuses.

CLASSIFICATION.

It is unnecessary for me to go into detail before this society in regard to this most interesting work even tho I had the time. For my own convenience I have classified these ocular disturbances as follows:

1. Metastatic infections.
2. By continuity.
3. Trophic and irritative.

1. The metastatic infections are carried by the blood or lymph stream, and belong to the same general class as the acute infectious arthrides and myositides. In children and young people they are most frequently due to the tonsils. As the sinuses develop they play an increasingly important role; and with the decay of the teeth alveolar abscesses are the source of infection. Pyorrhea, unless of extreme degree, is in my opinion, seldom the cause of metastatic infection. In this group is iritis, episcleritis, uveitis, chorioretinitis, retinitis, neuritis and orbital cellulitis.

2. By direct continuity. Owing to the intimate association of the optic nerve with the sphenoid and post ethmoid cells, any inflammation of the latter is liable to involve it. The same is true in orbital cellulitis from the ethmoid, antra, or frontal sinuses.

3. Trophic or irritative. This is a very interesting group of diseases and belongs to an entirely different class from those in the former two. Here we have a lesion produced in a neighboring organ, by an irritation of branches of a common nerve, or thru the sympathetic nervous system. Many of the lesions in the eye such as a superficial corneal ulceration seem to be of a herpetic nature. The condition in the nose is not necessarily an inflammatory one. In this group is blepharitis, photophobia, blepharospasm, epiphora, superficial minute corneal ulcers, and ocular pain.

This classification while it may not hold true in all cases, has the advantage of giving the rhinologist a definite working basis. Metastatic infection

necessitates a focus of infection, usually with the formation of pus. Infections by continuity frequently present greater difficulties; as the infection may not result in the formation of pus, but may be confined to an inflammation of the mucous membrane lining the cells, and extending directly to contiguous structures. I have found it not infrequent in a retrobulbar optic neuritis, that upon opening a sphenoid or posterior ethmoid cell, there was a marked inflammation of the mucous membrane but no pus. The proof of the diagnosis, however, has been established by the prompt improvement of the vision.

It is this class of cases that are most baffling, and to make a diagnosis requires the closest cooperation of the ophthalmologist and rhinologist. The history usually reveals that from one to twelve weeks previous to the onset of the eye symptoms the patient had an acute cold or other malady involving the nose, from which in many cases they seem to have entirely recovered. Only one eye is affected, or if both, the onset in one preceded the other. Usually there is a history of acute pain over the midparietal region, often confined to an area not larger than a quarter of a dollar, and distinctly tender. There is usually pain referred to the temple of the affected side. If the vision is sufficient to get a field, the enlargement of the blind spot and concentric limitation for form and color, can usually be demonstrated.

Ophthalmologic findings are generally negative. If there is the usual evidence of an infected sinus, e. g. tumefaction of the turbinates, some hyperemia, and pus from the ethmoids and sphenoid, a diagnosis is easy. But in many of these cases, especially if of streptococcic origin, when seen early the deviation from the normal is slight. Careful examination, however, will usually reveal one or more of the following: A slight edema or turgescence of the mucous membrane of the middle turbinate or ethmoid; a redness of the mucous membrane of the nasopharynx often unilateral; a swelling of

the posterior tip of the middle turbinate, or a slight discharge on the posterior wall of the nasopharynx from the ostium of the sphenoidal sinus. In many cases it is possible to probe the sphenoidal sinus with a slightly curved canula, and if pus is present, it can be demonstrated either by irrigation or suction.

In those cases in which the lesion is due to trophic disturbances or irritation, the determination of the cause is frequently difficult. If there is a spur pressing upon one of the turbinates, or a marked deviation of the nasal septum, they may well be chosen. Any evidence of infection of the ethmoid

indicates it as the point to be attacked. A hypertrophied middle turbinate may harbor an infected misplaced ethmoid cell; or in the absence of any of these, an apparently innocent middle turbinate may be tumifying at night or at other times when the patient is not under observation sufficiently to furnish the required irritation.

The treatment of all these cases is to remove the offending cause. If this can be done promptly without endangering the eye by treatment, it should be employed; but if the optical lesion is serious, there should be no hesitation in instituting whatever surgical procedure is necessary.

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PRACTICAL OBSERVATIONS ON REFRACTION.

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AURORA, NEBRASKA.

With an account of the routine methods employed in refraction work, the author gives his estimate of their relative importance, and observations concerning certain unsettled questions. Read before the Colorado Congress of Ophthalmology and Otolaryngology, August 4, 1919.

Under the recently inaugurated movement to improve instruction in ophthalmology in medical and post-graduate schools, a need proven by the experiences of the war, there will be required first of all improved methods of instruction in refraction. This is the greater part of the specialty, highly technical, and in this most of the errors are made. A plea for greater accuracy in refraction, and study de-

voted to the individual case is the basis for a paper on this time worn subject.

That glaring blunders are committed by men in the specialty, to say nothing of the so-called optometrists, needs no proof; the number of small and avoidable errors in the practice of almost every refractionist is greater than he might be willing to admit. Recently a patient came to me wearing a pair of

prisms of 5 and 6 degrees bases out, and this same patient was immediately able to fix distant objects with some difficulty, correcting 5 degrees of hyperphoria at the same time, after the glasses had been removed. The patient was first supplied with a pair of weaker prisms bases out, and in a short time had been given these strong prisms. Such a prescription can have no justification whatever. The hyperphoria should have been partially corrected; and if the esophoria would not yield to prism exercises, an operation should have been done.

The ideal in refraction is to make the eye emmetropic. Emmetropia is described as that condition of the eye which will permit of perfect distant vision with the eye absolutely at rest; a condition rare indeed. By far the larger number are hyperopic to a small degree, and the question arises whether slight hyperopia is not the normal condition. Certainly it is if an average is to be considered normal. Personally I believe such to be the case, since such an eye can see perfectly at distance without apparent effort, and no trouble results until the presbyopic age is reached. Unfortunately for this belief there are a great many more with astigmatia, and no one will contend that astigmatia is a normal condition.

METHODS. First, a carefully made manifest test with the trial case, dial and test letters. This test is identical with that used after the cycloplegia, so it will be described here. One eye is tested at a time. Strong lenses are used at first, and weaker ones gradually substituted until one or more of the lines of the dial are distinct. The axis is fixed by the relative distinctness of the lines on either side, and the fogged lines cleared up with minus cylinders at 90 degrees to the major axis; being very careful not to over correct, which is a much more serious error than under correction. A weak sphere is then held in front of the combination and the patient asked whether the lines are equally fogged. If so a weak minus sphere is tried to note if vision is

greatly improved. When the best possible appearance of the dial is obtained, the vision on the letter chart will usually be 6/6 or better. After both eyes are tested the opaque disc is passed before each alternately, and any difference in vision corrected by slight change of spheres. The muscular balance is then determined by means of the Maddox rod and phorometer, in vertical and horizontal meridians; the adduction and abduction by means of rotary prisms, and the abduction in accommodation, and movements by the finger or pencil.

Cycloplegia is usually rapid and thorough from instillations of 1 per cent solution of homatropin every 10 minutes for one hour, seven instillations in all. It will not be complete at the end of the hour, but in 15 to 30 minutes later.

Retinoscopy under these conditions yields very accurate results, and seldom will the chart test fail to show approximately the same. Since the arm is a better measure of distance than the eye the half meter distance is more accurate. A little practice with the tape measure will show the proper curve of the elbow to obtain the half meter, but should be used occasionally to "check up" distance. This is also more rapid because the lenses are quickly changed and the frame can be dispensed with. Cylinders can be used in combination with the spheres if desired, holding the lenses together. In my own experience the greatest difficulty has been from insufficient cycloplegia, which must be complete to obtain reliable results. When used in the manner described little difficulty has resulted. Two or three instillations will not suffice, but must be continued for an hour and the retinoscopy done 15 to 30 minutes later.

The chart test made in the manner described, without regard to the retinoscopic findings will usually give the same results, but where there is a slight difference the chart results should be used if the patient is intelligent, and responsive. The final prescription should usually total about the same as the total manifest error, since

a much greater sphere will cause the patient to reject the lenses. If, however, the latent hyperopia is great, a portion at least should be corrected. I do not believe it necessary to correct the latent hyperopia of the young unless it is excessive, or correction called for by reason of squint or heterophoria. Usually a reduction of one-half to one diopter will make the lens about the same as the total manifest error. Where it is desirable to correct a large latent hyperopia a postcycloplegic test should be made, not less than 4 days later. This is an excellent procedure in all cases where possible.

The haphazard method of holding a sphere before the eye and asking the patient "is that better," and using the cylinders in the same way, is not a scientific method by any means, and seldom will an accurate measure of the astigmatism result. There have been many objections made to the use of the dial, and some have gone so far as to dispense with it entirely. I do not see how it is possible to measure astigmatism without it, or some of its various modifications, all of which embody the same underlying principle. Perhaps it can be done. It should be interesting to learn how.

The lens desired is that with which all of the lines of the dial will be fogged by the addition of a weak plus sphere. That is the lens which makes the eye emmetropic, and which should be prescribed, less the amount of latent hyperopia it is not desired to correct.

Hyperphoria should be corrected to one-half or one-third of the total by prisms, bases at 90 degrees, up and down. No prisms should be used for lateral deviations.

A careful study of the fundus should be made in every case, using an ophthalmoscope that will permit of rapid changing of the lenses without altering the position of patient, observer, or instrument. No single lens will give a clear view of all details of the fundus, the presence or depth of the physiologic cup, or presence of opacities of the media. Hence the neces-

sity of an instrument which will enable the examination to be made without loss of time or annoyance to the patient. A large number of interesting anomalies of the fundus, as well as pathologic conditions, are discovered by its routine use.

PREScribing LENSES.

In prescribing *bifocal lenses* the strongest possible distance lens should be used, and the weakest reading segment that will suffice, taking into consideration the character of the work to be done. Desk work will require clear vision at 20 to 30 inches, and an ordinary reading segment will be too strong for the purpose. If the distance lens is right it will seldom be necessary to prescribe more than 2.50 D. or at most 2.75 D. even in extreme old age.

The fitting of frames is a sadly neglected subject in literature and practice, but a no less important one than refraction. What benefit will result from the most careful refraction, if the lenses are improperly held before the eye, pupillary distance too great, too close or too far from the eye, or one lens higher than the other? They should be as close as the lashes will allow; as large as the P. D. will permit, or if larger then the lenses should each be decentered inward to one-half the difference. Observation has shown that this important work is often left for others to do, perhaps unskilled, and the ophthalmologist never sees the patient after the frames are fitted. The result has sometimes been that the patient is thoroly dissatisfied with an excellent refraction, unaware that the frames are at fault and blames the ophthalmologist for the failure.

From my own observation and conversation with others I believe the use of tinted lenses mischievous in the extreme. To accustom the eye to a modified light is to make it more sensitive to the rays filtered out by the lens. The patient is then in the same condition as before the tinted lenses were used, unable to get along without them, still suffering from the light received thru them. This is exactly analogous

to the use of prisms for esophoria and the results are about as bad. A better way would be to prescribe clear lenses for regular use, and a pair of pale amber tint for use in exceedingly bright light, and under that condition only. Most of the complaints of photophobia will clear up under the use of properly fitted lenses, and the tinted lenses will not be needed. When tints are prescribed they should be of a pale amber color. Amethyst glass filters out only the longer rays and admits the violets, thus defeating the purpose for which they were intended, and should never be used.

The retinoscope offers a field for a greater divergence of opinion, than any other part of this work. A personal application to an acknowledged leader in the specialty was answered by the statement that he did not consider it reliable in any case, useless in most cases, and that he did not use it where any other method was practicable. He also stated that he knew of no ophthalmologist who used or recommended it. This answer in the light of the present indicates that he could not have been familiar with its use. The School of Ophthalmology at Camp Greenleaf designed by Col. de Schweinitz, and conducted by Major Meyer Weiner was one of the best postgraduate schools for the reason that it was properly systematized, a quality sadly lacking in the average postgraduate school. At this school great emphasis was laid upon retinoscopy; and undoubtedly many of the students who were unable to use it suc-

cessfully before that training are now making practical use of it.

If in the hurry incident to a large practice not more than 5 to 15 minutes are devoted to a single case an injustice is done to both refractionist and patient. It is hardly possible to do an accurate refraction in so short a time, and if the method described is used it will require at least 30 to 45 minutes. The custom in some places of each of a number spending a few minutes with the patient, comparing results and prescribing a composite lens is not good practice. Patients complain bitterly of this procedure, and since a part, at least, of the work is done under incomplete cyclopegia, the results are necessarily in doubt. A careful measure by one refractionist giving sufficient time to insure accuracy would save as much time as the partial work of a number and be much more satisfactory to him and the patient.

In a recent number of the American Journal of Ophthalmology is a statement from an eminent writer that in every case except young children a myotic should be used to overcome the effects of the homatropin. At least this is debatable ground. A personal use of it, with proper consideration of the discomforts during the hour following will be a strong argument against its use. In a proper subject for homatropin no unfavorable symptoms will ever result; the patient will be quite comfortable with a pair of amber sun glasses, and able to use the eyes to a limited extent the following day.

HETROPHORIA AND HETEROTROPIA.

WILL WALTER,

CHICAGO (EVANSTON), ILL.

This discussion of its subject from an unusual point of view, connects the ocular movements with the autonomic or vegetative nervous system, and urges the importance of early correction of ametropia, before the Michigan State Medical Society, May, 1919.

I do not know that I bring you any special message on ocular balance—rather imbalance—in response to the kind invitation of your program committee. The subject is a complicated one, and many viewpoints are necessary. Often men in discussion, are expressing the same views in varying terms.

Some different—perhaps original—conceptions of basic principles have been evolved which may be of interest to view. Our discussion will therefore be very general and is based upon what may be called a psycho-physiologic viewpoint.

NORMAL BALANCE of the globes under control of the extraocular muscles is desirable for several reasons.

First: For binocular single vision—when possible. This presupposes the functioning of both eyes for better seeing and is present only when sufficient vision exists in a fellow eye to help by fusion of its image with the fixing eye. If the visual axes are parallel, binocular vision is better than monocular even though one eye carries a much lower acuity. In this case the poor seeing—or as we shall call it, the trailing eye—gives steadiness by peripheral stimuli when central vision is low, and probably always by motor impulses, the quickened mental aptitude which goes with the use of two symmetric anatomic body elements over one alone. This is easy of verification in daily tests.

We have come to believe that even with equal and normal vision in both eyes, one eye is fixing whilst the other is steadying and aiding by adjuvant impulses of retinal and motor stimuli. In right handed subjects it is usually the right eye which fixes and the left which trails, whilst in the left handed the left eye leads and the right does

the reenforcing. Assuming equal vision in both eyes, there are few exceptions to this. You are of course familiar with the hole in the card test but I would be pleased to have you test it in your own cases as a matter of interest, if you have not tried it, and find whether you are right eyed if right handed, or left eyed if left handed.

A study of ocular rotations in normals gives evidence that this is of some importance. It will be found by the tropometer that there is more power of adversion in left eyes of right handed subjects and more in the right eyes of left handed subjects. If right handed subjects are habitually right eyed, fixing as they do with the right eye in the primary position, and looking straight ahead—which they also do—causes the left eye to be adverted to fix upon the same object; and the more so the wider the pupillary distance and the nearer the object is viewed.

Coincident with this, I have observed that there is a tilting outward of the vertical meridian of the trailing eye. This, it seems to me, is the explanation of the frequent finding of a "plus declination" of the left eye which Stevens has thought to be due to the greater development of the left hemisphere in right handed subjects. I have come to regard an outward tilt of the trailing eye, and the greater adversion as a normal finding; and I am influenced in my choice of muscles for operation by this factor. Our habit of gaze is below the horizon and toward the median line, and the summation of this training leads to the tilting. Our rotations as you know approximate 35° upward but 50° downward, 45° to 50° outward but 50° to 55° inward.

The **second reason** for ocular parallelism is comfort. Parallelism may

exist under stress with perfect binocular vision but with discomfort. This may be manifest to consciousness or it may not. When it is not its effects are of the most subtle type. There may be as you know any degree of phoria or tropia in subjects without complaints, but the effects nevertheless lie deeply upon the central nervous system; and are evidenced in more or less remote muscle tensions or relaxations and attitudes of body and mind. They show in head poses which are marked in the hyperphorias, or in facial—especially frontal—lines and grimace most noted in hyper-eso- or hyper-exophorias; or in the steep vertical forehead lines and in the stooping posture and half bent knee of esophoria and in the esotropia subject, when vision is fairly equal in both eyes.

In a paper before the Ophth. Section of the A. M. A. in 1916 I linked up the ocular movements with the autonomic or so-called vegetative nervous system. To this we shall refer later. What I wish to call your attention to now is that this system is automatic, is independent of our wills, and is in general acted upon in all of its ramifications by similar stimuli. This nervous system, as you know, presides over all of our fundamental functions, circulation, respiration, the cardiac rhythm, gastro-enteric peristalsis, the ductless glands; and extends in general where control by volition would be hazardous, slow and impossible.

There is either normal tonus when everything is in balance; or overtonus resulting in excessive contractures, bronchospasm, acceleration of pulse during respiration, and it is everywhere relaxed by atropin; or there is undertonus which is stimulated by pilocarpin or on occasion by adrenalin or by strychnin. We link accommodation and convergence into this system and make overtonus, or over stimulation on one element, lead to overtonus on the other.

A study of this tells us several things but one which seems to have missed attention, viz., that an hyperopia and an associated convergence excess or an esophoria, or an esotropia

must, by laws governing the correlation of elements of this nervous system, react upon its other elements. This offers another, perhaps less complicated, explanation of the associated posture, the bent knee, the closed countenance, the enteroptoses so often found in these cases; and per contra, a low accommodation and convergence stimulus with exophoria or exotropia, lead to the reverse of this—the open countenance, the erect posture and all that.

The most uncomfortable subject of all is the myope with esophoria or the hyperope with exophoria, for he is in perpetual neural discord; two sides of the automatic nervous system always in conflict.

The **third reason** for parallelism is for appearance, and this applies to the phorias in minor measure.

DISCUSSION: I would have you think of the influence of the actions and reactions over this fundamental mechanism. It goes on independent of our volition.

We may will to look in any direction or even to converge our eyes, and we know that the frontal lobes have this control over the direction of our gaze. But this volitional control occupies a secondary pathway when an alarming sound, an ominous odor or a surface irritation—an automatically acting stimulus takes the pathway. Otherwise there would be no existence for us, because volition is too slow for defense. This is not speculative, it is demonstrable. For if the frontal lobes are removed or disconnected there is a reversion to the infantile ocular movements—inability to fix the gaze—but there is no lack of parallelism. The binocular functions are disturbed but only temporarily, since definite movements will follow when the gaze falls upon food or when sound or some other stimulus attracts. Movement is then purposeful.

The vegetative system is not infallible and may go wrong, and hence persistent undertonus or overtonus may exist independent of errors of refraction, and such a condition, either as a disorder of automatic

function or as an atavism, would explain exophorias in some cases. This may begin early in life, as convergence insufficiency from lack of tonus, and go over to divergence excess or even to exotropia. This seems a reasonable hypothesis of the etiology of exophoria or exotropia. If this is so, hope is offered through the study of the stimulation of tonus in the automatic nervous mechanism.

APPLICATION: But you ask, has this discussion any bearing upon our real problem—that of correcting these imbalances? It seems to me to have most elemental influence.

Child Study experts tell us that the real formative period is before the first year of life. Action stimuli sink deeply into the delicate nervous structures, and the eye covers a large area in this field. Hyperopia and convergence stimulation, or myopia with the lack of it are bad; anisometropia is worse. No one can estimate the evil influence of these elements in the formative period of life.

If this reflex organization is out of tune, the whole structure suffers and we have added reasons for setting them in order as early in life as possible.

I have made the statement that anisometropes should be born "with glasses on" to aid in the early correlation of the eyes. The earliest we can correct is not early enough. If one eye is poor in vision or out of action, it will not fix, suppression of vision will be the way out, and then the effect is divergence or convergence or some combined deviation. This deviation is always in the line of the dominant pull—a physical anatomic effect in these cases—and the long train of contractions or stretchings is in action.

Hysteric effects are never manifest in imbalance—they are always disorders of associated movements. They are in the high level of control, whilst imbalance lies always in the mid or lower levels.

Hyperopia and ciliary overdevelopment, esophoria and esotropia, represent the positive side of this mechan-

ism. They are akin to compensatory cardiac action. The negative side of the mechanism is underdevelopment or dystrophy, exophoria or exotropia, negative or underconvergence or divergence excess. They are akin to loss of cardiac compensation.

One may see the need of correcting errors of refraction before the period of training of coordinations is passed. They are generally well established by the sixth year of life. By this means there is a chance to forestall the overgrowth or undergrowth which, once developed, tends to perpetuate itself under habit impulses. The end-result of relative overstimulation or understimulation over the ciliary arc during the development period will be a phoria so long as fusion can carry the load. It will be a tropia when it cannot. Thus I have made the claim that exophoria and exotropia are due always to lack or relative lack of convergence. Exophoria is negative convergence—actual or relative.

I would call your attention to the fact that there can exist, logically, no power of divergence, nor of sursumvergence. That nothing but diplopia could follow such a primary act. Divergence would have no physiologic value. Therefore when the eye of a subject diverges either under cover or in the open it is due to relaxation on the positive side. It is not a primary divergence act. Certain of the exotropias are atavisms. No development of convergence. No fusion. The arc which influences this segment of the automatic is from the ciliary muscle back to the coordinating centers thence to the convergence. It may overact as in hyperopia or underact as in myopia. It may be relaxed by atropin—or by such a drug as adalin, on the automatic centers, as I have observed. It may be stimulated by pilocarpin types. But the early training of this reflex system is the most fundamental factor in prevention.

How about the practical application of these observations to the case in hand?

As the first step we must dismiss from our minds all thought of the primary influence of the will over the

phorias and tropias. This is the first step. Muscle balance is dependent upon the reflex automatic functions first and upon the dominance of pull secondly—the latter depending upon abnormal elements of insertions of tendon and all that.

Our second step is to determine what is a normal balance. I have gone into this elsewhere and shall not take your time. My conclusion is that an exophoria of 2° may be fairly considered normal in adults. That under puberty it runs slightly to the esophoria side. The change in normal balance which takes place after puberty is parallel with other changes in the automatic nervous mechanism.

Another interesting thing happens later in life, i. e., toward fifty years of age and beyond; and then we have to look more carefully to the near balance. With the progressive loss of accommodative power comes a disturbance of the correlated convergence and we may find confusion for a time. Perhaps an esophoria, perhaps an exophoria for near. New habits must be formed over this mechanism.

This is a strong point for the early and gradual correction of presbyopia as against the delayed and the big jump method. Early correction furnishes a training of the changed relations. I believe the profession has come to accept an exophoria of 3° or 4° for near as normal. But with advancing years and the application of lenses for presbyopia comes an increasing exophoria for near, due to lack of ciliary arc stimulus. This may attain a pathologic degree; an increase by the Walton test—which is the one I now employ—up to 8° or 10° or even 15° is not unusual. We often have complaints by these patients of discomfort with their near lenses and are apt to find this exophoria for near. Its relief is not easy, since the stronger the near correction the less the stimulus to convergence, and the greater the exophoria, and incidentally the discomfort.

The third step is to realize that imbalance is not due to a muscle but to a coordinated group of muscles. Convergence is a positive function. On the

convergence side are three muscles all supplied by the same nerve. Convergence is never due to the action of the internus alone. It is impossible to conceive of any ocular movement being brought about by a single muscle. Maddox has given us the best table for creation of the binocular eye. It is based upon the coordinated groups, the creation and the directing of the binocular eye.

The fourth step is to realize that the symptoms of ocular imbalance, the phorias especially, are influenced by fatigue elements. I believe it was in 1895 that we presented a paper on asthenopia as a fatigue neurosis, and compared it to "writers' cramp" and other fatigue neuroses. Like them it is divisible into spastic and neuralgic types. The evidence offered is that it is the central coordination which fatigues; and not the muscles since the latter may be used for other acts and other rotations without distress.

Another point is that prisms wrongly placed or exercises wrongly done will often relieve distress temporarily. This is due to the rest afforded the coordination by the change. Therefore the bodily state, as to endurance, autointoxication, hygiene, ventilation and all such measures, have direct influence upon ocular comfort in imbalance; but especially the amount of use, i. e., the abuse of the eyes for fine work. The next step is to realize why prisms relieve, and why the relief is but temporary; never leading to cure, —only to palliation. I have discussed this in detail in previous papers and I have already taken too much time.

CONCLUSIONS: The **nonoperative way** to correct heterophoria and heterotropia (and it will help just in proportion to how early it is begun) is over the ciliary arc reflex loop upon which we have been dwelling so much.

That is to say, in the "eso" types we may reduce the ciliary stimulus to convergence by plus lenses giving full correction of distance error. Then, if needed, the adding of plus lenses for near as suggested by Linn Emerson or by creating continuous artificial myopia by the constant wear of over

correction with plus lenses for near and far, as I have advocated.

The way to increase the convergence side, is by the positive stimulus afforded by minus lenses, loading the accommodation, creating artificial hyperopia, sending in afferent impulses to stimulate the coordination. Prisms will do none of this because they are not acting on this reflex arc.

The operative way to correct, failing in the nonoperative, is over the dominant muscles of the groups; and the muscles of election in my practice are the internus and the externus for lateral deviations. One should be governed by tropometric measurements in this.

The superior rectus is elected for correction of tiltings and for hyperphorias. There is not time for details on this, nor for the application of the anatomic elements.

We have endeavored to deal with principles; and principles, well understood, make therapy a matter of detail. We cannot go far wrong if we are right in fundamentals.

I apologize for not being more concise. There is much to be said and much work to be done. We must take all viewpoints. We must study all of the elements. Be like the spider in our attack and go on all of our legs! We can't go far on one.

NOTES, CASES AND INSTRUMENTS

TUBERCULOSIS OF THE CONJUNCTIVA

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DENVER, COLO.

Mabel M., age eight months, was admitted to the Children's Hospital on March 11, 1919, with the following history:

Had double pneumonia a month before coming to the hospital. During the attack of pneumonia, had an ulcer on the cornea of right eye which perforated. She was very poorly nourished and emaciated.

The lids of the right eye were quite swollen and thickened. Considerable mucopurulent discharge. Small staphylococci of the cornea. Ocular conjunctiva quite red. On the upper tarsal conjunctiva, there was a necrotic ulcer involving one half of the tarsus. The edges were very irregular, thickened, and of a dirty gray color. The base of the ulcer was covered with grayish exudate. The conjunctiva was studded with numbers of small nodules, yellowish in color, resembling tubercular deposits. On the lower lid of the same eye, there were also, a number of these yellowish nodules, some of which had coalesced and formed an ulcer of the same character as on upper lid. The tarsal conjunctiva of both lids was covered with an exudate, which when removed, bled quite freely. (See Color Plate III, Fig. 2.)

The physical examination was negative; Wassermann negative; von Pirquet negative. The conjunctival secretion showed no specific germ. Throat culture also negative. Pulse very rapid, and temperature varying from 100 degrees to 102.

On the affected side, the preauricular, submaxillary, and cervical glands were very much enlarged.

A piece of the ulcer was excised and examined by Dr. Wm. C. Finnoff, and found to be tuberculous. Both the characteristic structure and bacilli were present.

The child died ten days after she was

admitted to the hospital. No autopsy could be held.

EXCISION OF THE LACRIMAL SAC.

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PHILADELPHIA, PA.

(Read before the Section on Ophthalmology of the Philadelphia College of Physicians, Nov. 20, 1919. See p. 221.)

Before Meller gave us his precise and elaborate account of his method of removing the lacrimal sac, that procedure, in my hands at least, was one of the most unsatisfactory one was called upon to perform upon the ocular adnexa. With bleeding uncontrolled, one groped about in the spurting and welling up blood from around the hidden sac, making desperate attempts at its removal with frantic jabs of the scissors. It is no wonder that the removal of the sac in those days found favor with but few. But with the hemorrhage controlled in the manner indicated by Meller, the removal of the sac by careful dissection, has become a most interesting and satisfying operation.

First, a word as to the method. All operators have their individual idiosyncracies and after performing any operation a number of times, it is more than likely that each surgeon will depart somewhat from the model erected for his guidance, yet I am convinced that the more rigidly one adheres to every detail of the directions outlined by Meller, as found in his *Ophthalmic Surgery* edited by Sweet, the easier will the sac be removed and the better the result attained, for the entire description is a marvel of lucidity and exactness.

My individual deviations from this description are few. Novocain in 2% solution is substituted for cocain, as being less toxic, and the solution is injected with an ordinary hypodermic needle instead of with a Pravaz syringe. Not infrequently, also, if the in-

jections have failed to control all the hemorrhage, a few minims of a solution of adrenalin, 1—2000, are injected along the lips of the wound.

As the years have gone by and experience gained, I have ceased searching so steadfastly for every layer of tissue, and have with some freedom cut more deeply, searching particularly for the internal palpebral ligament. So soon as this structure becomes visible, the position of the sublying sac is secured and its dissection in most cases easily attained. In some instances, and this is especially true when the sac lies deeply, the separation of its outer wall from the orbital tissues is quite difficult and must be done with considerable caution to avoid entering the orbital fat, or perforating the walls of the sac.

As stated by Meller, the tissues about the apex of the sac are especially vascular and the severing of that part of the structure from its surroundings is frequently followed by profuse bleeding. It is well, therefore, to make this step the final one and to divide all other connections of the sac previously.

After the cavity has been thoroughly dried, I have found it desirable to carefully inspect the fossa from which the sac has been excised, for any remnant of sac tissues, and to remove the same before closing the wound, for the smallest piece of retained mucous membrane interferes with healing. Likewise it is well to thoroly curette the mucous membrane of the canaliculi after these latter have been slit up, for it not infrequently happens that ectasias distend their lumen and increase the surface of mucous membrane lining them. If some of this mucous membrane is left, a troublesome mucopurulent discharge will persist, even though the sac itself has been successfully removed. In sewing up the wound, I do not aim specially to reunite the severed ends of the tarsal ligament, but coaptate the edges of the entire wound as carefully as possible with interrupted sutures. I observe Meller's injunctions regarding the

dressings, but remove the stitches on the third day. A bandage is applied for one week. Most cases heal by first intention and some months later. In only a few has there been a trace of scarring. In one case a rather disfiguring keloid supervened.

I advise the removal of the sac in all cases where there is a mucopurulent discharge from the sac, and in all mucocoeles where pressure fails to squeeze out the contents of the sac either into the nose or the conjunctival culdesac; also of all infected sacs prior to any operation which necessitates an incision into the globe; also all cases of neoplasm or suspected neoplasm of the sac.

The results of the operation, in so far as it removes the source of the irritating and annoying discharge into the conjunctival culdesac, are usually very satisfactory. In some cases where some particle of diseased mucous membrane of sac or canaliculus has been overlooked, the discharge persists and further treatment by curetting, cauterization or dissection is necessitated. But in most instances the irritation of the conjunctival mucous membrane is relieved and the most the patient will complain of is undue tearing after psychic or mechanical irritation of the lacrimal gland. The annoyance of this symptom varies according to the nervous susceptibility of the individual. Some advocate the removal of the lacrimal glands for its relief. I have never had recourse to this, having been usually successful in persuading the dissatisfied, that time will do much to alleviate the annoyance of which they complain.

Removal of the sac gets rid of a diseased structure, but it does not restore the lacrimal apparatus to a normal condition. Indeed it annihilates for all time the excretory mechanism. Any operation, therefore, which permits of the restoration of the mucous membrane of the sac to a healthy condition and establishes free and permanent drainage, should be regarded with favor and receive proper trial in selected cases.

I have never attempted to establish intranasal drainage; in the first place, because I am not a nasal surgeon and lack the special training necessary for its proper accomplishment; and I have not referred my cases to a rhinologist for this purpose, not only because, so far as I know, there is no one in this city who has practised this method, but also for the reason that such procedures did not appeal to me as being practical. I did not doubt the feasibility of draining the sac into the nose, but I questioned the influence of nasal conditions in the sac, and the possibility of maintaining a healthy mucous membrane in the the sac and free drainage into the nose under such conditions.

BURN OF BOTH EYES BY SALT OF COPPER

HOWARD F. HANSELL, M. D.

PHILADELPHIA, PA.

Mr. W., 55 years old, was severely burned by an explosion October 12, 1919. He was brought from his home in an inland town immediately to the Jefferson Hospital. He presented a most peculiar appearance. The lids were swollen and discolored. The conjunctivas over their entire extent, even up to the fornices, were overlaid with a foreign substance, smooth and dark. The same material covered the corneas, excepting a small area in the center of each. Vision was reduced to seeing large objects. The skin of the face was involved in many places and in these superficial wounds was deposited the same dark material. The man was suffering from shock and the fear of blindness and the usual symptoms of severe ocular burn.

Dr. Hinkel, his physician, stated that the exact composition of the explosive was unknown; that the patent belonged to a German living in America, who had been commanded by his government not to divulge the secret under penalty of death, and being a loyal son of the Fatherland, kept the secret. The invention was used to cap matches which

were exploded in the mines by electricity, and their superiority over all other matches was conceded. They invariably exploded when the current was turned on and could always be depended on. No instance of failure has ever been recorded. Even a layman may understand that this is a life saving invention and in great demand in all quarries and mines. Its main constituents are a salt of copper and ammonia, welded by acetylene gas. The patient after having reduced the compound to a dry, coarse powder was engaged in crushing the little lumps with a spatula. Without warning the mass exploded.

The palpebral conjunctiva and the cornea were hidden from view except the pupillary area of both corneas by a dark blue, thin, smooth layer of the explosive. With a damp wisp of cotton rolled on the end of a tooth pick this material could be easily removed in little pieces. The epithelium of the cornea and conjunctiva came away with it, leaving a raw and bleeding surface. The unwounded portion of the cornea preserved its epithelium but had lost its transparency because of a superficial infiltration. The eyes were cleansed and the black layer of foreign substance with adhering conjunctiva and corneal epithelium was removed. Ice compresses, atropia and fluid vaseline were ordered. The inflammation and edema of the lids and skin of the face gradually subsided but the corneal infiltration increased and both corneas became entirely denuded of their epithelium during the following ten days. The treatment was continued at his home and on the 18th of November he was again admitted to the hospital for superficial, central corneal ulceration. A low grade of iritis had developed in the left eye. Under atropin, dionin, hot compresses and frequent cleansing of the conjunctival sac with mild antiseptics the inflammation subsided and the ulcers healed, with the exception of a small area in the center of the right cornea. A small symblepharon had formed in the conjunctiva of the right side.

The features that prove of greatest interest in this case are the character of

the injury and the prolonged recovery. From the man's description of the accident I infer that the material that he was powdering was not hot and therefore the injury to the eyes was not strictly a burn but a destruction of the epithelium and parts immediately beneath it by chemical action. The dark, smooth layer of foreign substance was a salt of copper, probably the oxide, which, lying in intimate contact with the superficial tissues more or less rapidly destroyed them.

The appearance of the eyes after the layer of copper was removed was so much more favorable than could have been expected that recovery in a few days seemed assured. Recovery, on the contrary, was protracted and imperfect. After two months, vision equalled counting fingers at a few feet. The impaired vision was due to infiltrated and ulcerated corneas. In the left eye, in which the erosion seemed to be less severe, vision was improving from day to day.

The prolonged inflammation in the cornea as exhibited by this patient reminds one of the "recurring erosion" of Fuchs, described first in 1872 by Hansen and later by other European and American ophthalmologists. The resemblance is not striking. In the case above recorded there is absence of the sharp pain and of the formation of blebs characteristic of recurring erosion, but there is alternate loss and regeneration of epithelium, the cause of which may be looked for in the partial destruction of the lymph spaces of the cornea and the vessels of the pericorneal ring and probably also mechanical interference with the function of the corneal nerves.

The case is, in my experience, unique and in the progress of the affection has pursued a course different from that of other cases of burns. The recovery has been incomplete, the convalescence prolonged and the anatomic changes, at first superficial, later involving the deeper tissues, all of which reflects doubt on the wisdom of the treatment, but offers no suggestions as to a more beneficial therapy.

RECURRING KERATO-CONJUNCTIVITIS FOLLOWING EXPOSURE TO DICHLORETHYLSULPHID.

JAMES H. MCKELLAR, M. D.

LOS ANGELES, CALIFORNIA.

The following case is reported, owing to the apparent rarity of recurrent inflammation of the ocular structures, due to exposure of the eyes to the action of mustard gas (dichlorethylsulphid), in spite of its intense primary inflammatory results. In fact I have been able to find only one reference to recurring attacks of inflammation of this nature or even partly of this nature, and that in 'Circular I, issued by the Division of Ophthalmology, Headquarters of Medical and Surgical Consultants, A. E. F., France, in which attention is called to relapses of mustard gas inflammation of the eyes, self induced. The patient whose case is reported here, however, was out of the military service at the time he was under my treatment, and I did not believe him to be a malingerer. Verhoeff, in discussing Derby's paper at the last meeting of the American Ophthalmol. Soc. (A.J.O. v. 2 p.), speaks of the irritability of eyes that have suffered from gassing.

Another reason for reporting this case is the thought that it may suggest a possible etiologic factor in some cases of keratitis and conjunctivitis in returned soldiers.

Report of Case:—June 9th, 1919.

V. H. B.—Clerk, age 26, recently discharged from military service. His general health is good. His previous history, general and ocular, is unimportant until after entering the service, except that the margins of his lids were generally red. There is no history of tuberculosis, either personal or family, and the Moro skin test is negative. The patient states that on the night of September 24th, 1918, near Thiaccourt, while on guard duty, he was exposed to mustard gas. The following morning his eyes were very badly inflamed. He was sent to a hospital where he remained five months, although the attack of eye inflammation lasted only about six weeks.

He had a second attack of inflammation at Brest, March 20th, 1919. The right eye only was affected and the attack was over in a week. He had a third attack at Camp Dix in April, which was about one week in duration.

History of present attack: Three days ago the eyes became violently inflamed, especially the right. This is the fourth attack.

Symptoms: Eyes feel much as they did in the first attack of inflammation, immediately following the gassing. Patient complains of pain, tearing, very marked photophobia, inability to use the

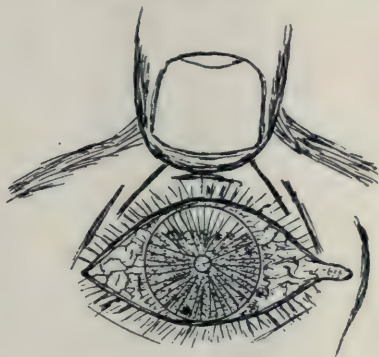


Fig. 1. Diagram showing distribution of corneal lesions due to dichlorethylsulphid.

eyes at all. The symptoms are much more marked in the right eye.

Examination: R.—Patient keeps this eye tightly closed in ordinary office day light, and resists any efforts to separate the lids. There is profuse lacrimation, no purulent discharge. The palbral conjunctiva is swollen and very hyperemic but not granulated. The ocular conjunctiva is greatly injected and ciliary injection is present. There is a superficial ulcer, one half mm. in diameter on the cornea at the lower limbus. See Fig. 1.

The anterior surface of the cornea is roughened in the area of its lower three-fourths. The upper part of the cornea, the portion normally protected by the upper lid is perfectly smooth. No distinct break in the corneal epithelium, however, can be detected except at the location of the before mentioned ulcer. Vision in this eye equals 5/30.

L. The condition of the conjunctiva

in this eye is much the same as in the right, tho the inflammation is less severe. There is no involvement of the cornea of this eye. The vision of the left eye is 5/4.

Treatment: Atropin sulph. instillations. Hot compresses every three hours, followed by instillations of argyrol 20% solution.

Progress of the case: June 11th, 1919, Eyes feel much better. The cornea is smooth in each eye.

June 13th, 1919. No pain is present in either eye. Photophobia is practically gone. The cornea of each eye is smooth. The ulcer is healed.

Vision: R. 5/4; L. 5/4.

June 25th, 1919. The patient has another relapse in the right eye. The symptoms, objective and subjective, are much milder than in the previous attack.

Treatment: Similar to that used in attack described. The symptoms lasted four days.

July 1st, 1919. Eyes appear normal except for slight conjunctival injection.

October 3rd, 1919. Patient reported today at my request. He states that he has had no further trouble with his eyes since June. His eyes appear normal, save for redness of the lid margins. This condition of redness, according to the statement of the patient, was present before he entered the service.

LYMPHOSARCOMA OF ORBIT, PROBABLY WITHIN THE CAP- SULE OF TENON

HARRY V. WÜRDEMANN,

SEATTLE, WASH.

Unusual size, shape and position of a large intraorbital growth, removed without enucleation of the eyeball.

Tho relatively uncommon, every ophthalmic surgeon has seen these neoplasms and some of us have had the opportunity to operate.

In the case of intraocular tumors it is necessary to remove the eye; in orbital growths complete exenteration of the orbital contents should usually be made. In a few of the latter, the chance has been afforded of saving the eyeball

with vision, in most of which with resection of the bony parts of the orbit by the Krölein-Danis or other operation. It is rare indeed that an extensive tumor of the orbit can be removed in toto without likewise sacrificing the eyeball. The following case has a number of unique points which render its record in print valuable:

A. N. F., aged 75, consulted me Sept. 9th, 1919, account of vision and pro-

to be done. Nov. 7th, 1919, Columbus Sanitarium, with Dr. Macbeth assisting, and Dr. Brookbank giving anesthesia, preparatory incisions for exenteration of the orbit were made, i.e., a full canthotomy and sweeping incision thru the conjunctiva and orbital tissue under the globe by which the outer aspect of the tumor was observed when it protruded like a turtle's head coming out of the shell. Exploration of the depths of the



Fig. 1. Patient suffering from lymphosarcoma of left orbit.

trusion of a growth under the left eyeball causing slight exophthalmos and double vision. Patient otherwise well preserved. Vision, right, 1/60; with glasses 6/20; vision left, 6/60. Right fundus normal; Left, optic disk congested; eyeball directed slightly upward; vertical diplopia.

Examination nose and sinuses negative, confirmed by X-ray. B. P. systolic, 160; diastolic, 75. Heart normal. Urine examination normal.

What was apparently a small movable tumor of the orbit, approximately 20 mm. in breadth and a little less in height was found under the eye. Patient advised that same could probably be removed then with preservation of the eyeball; advice at that time was not accepted, but returned nearly two months later, Nov. 6th, 1919, with great exophthalmos and edema from further growth of tumor. With some hesitation, advice was given for operation with the idea that removal of eyeball would have

orbit by the gloved finger was made and to our surprise it delivered itself in its capsule, the only adhesions apparently being to the orbital tissue, to Tenon's capsule and to the tendon of the inferior rectus muscle. These adhesions were dissected away with a small amount of orbital fat. As full exploration of the orbit showed no enlarged glands and apparently no involvement of the tissues, the wound was sewed up and a drain inserted, full healing taking place in two weeks when the patient returned home; there being slight degree of exophthalmos and double vision.

The tumor was apparently within Tenon's capsule about the size of the first two joints of the surgeon's forefinger, of a similar shape, rounded and smooth at the apical end, its surface smooth all the way up to its external end, the latter of which was nodulated and attached at the upper surface to globe. This tumor lay

lengthways of the orbit within the capsule just as if a finger had been pushed below the eye and the first two joints left therein; an extraordinary form and position, and was really a "floating" tumor.

On section it cut like liver, showing a complete capsule around it; the report of the pathologists being as follows: "The weight of tissue after fat had been dissected free from tumor was 10 grams. The tumor measured 4 cm. in length and $1\frac{1}{2}$ cm. in thickness. This specimen must be stated as

being a hyperplastic lymph node, a lymphosarcoma or small round cell sarcoma. It is composed of small round cells with a scarcely perceptible stroma. No lymph follicles are in evidence. The nodules adjoining the main tumor are of like structure."

Dec. 10th, 1919, altho only a little over one month is passed since the operation, there has apparently been no return of the growth as yet. It is possible that the neoplasm arose in a lymph node and was isolated.

SOCIETY PROCEEDINGS

COLORADO CONGRESS OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Ophthalmic Transactions

August 4-5, 1919.

The Capsule in Cataract Extraction.

EDWARD JACKSON, Denver, pointed out that the capsule of the crystalline lens varied in thickness at different distances from the center of the pupil. If it had the same index of refraction as the lens its refractive effect would be that of a concave lens of 0.12 to 0.25 D. Irregular thickenings, forming nodules, such as are found on other hyaline membranes and have been observed with hypermature cataract, might produce a dispersion of light comparable to that of ground glass.

The capsule itself is passive, whatever changes occur in it must be due to the epithelium adherent to it, and to other tissues that become associated with it. In the senile eye the changes due to epithelial activities are probably very slight. The membranes developing in the pupil after cataract extraction have for their most important constituent connective tissue, developed from fibroblasts furnished chiefly by the iris. The density of such membranes after cataract extraction is connected with the severity and persistence of postoperative inflammation.

Such inflammation is largely due to lens substance, remaining in contact

with the iris. It is generally absent after intracapsular extraction, after thorough routine irrigation of the anterior chamber following extraction; and also after the operation with peripheral capsulotomy, when all cortex left within the eye is left in the capsule and not in contact with the iris. Such a capsulotomy is made by bringing the back of the knife into the corneal incision, withdrawing it until the point is at the edge of the pupil and making a puncture in the capsule as wide as the pupil. The capsule then easily tears sufficiently to permit the exit of the lens. Satisfactory clinical experience with this method had been reported previously.

DISCUSSION: Marcus Feingold, New Orleans. The superficial incision mentioned by Jackson has other advantages, not so far brought out. Secondary cataract is also produced by the fact that the little blood left in the anterior chamber after a cataract extraction is likely to lead to very dense opacity in the capsule. Blood left in the anterior chamber will be easily absorbed over the surface of the iris itself, thru the crypts, but over the lens capsule it will be absorbed less readily. If there is an opening in the lens capsule it is likely to lead ultimately to rather dense opacity. If we would all use the peripheral incision recommended by Dr. Jackson, we should be less subject to opacity from hemorrhage in the anterior chamber.

Arnold Knapp, New York. The method used by my father, Herman Knapp, for many years has the advantage of avoiding adhesion of the capsule to the lips of the wound. It does allow of secondary cataract. My father did not consider a cataract operation complete until he had done a secondary operation. Personally, I think that in cutting the capsule it is important to get a large opening, to render retained cortex freely accessible to the aqueous. The histology of secondary cataract seems to me to show it definitely to be due to proliferation of the capsular cells, which are apparently converted into connective tissue. The secondary cataract in many cases is not due so much to formation of secondary membrane as to wrinkling of the posterior capsule. It is not possible to guarantee that secondary cataracts will not follow in any case by any method. Using the capsule forceps, you do not know how much of the capsule you remove, but are liable to have tags left which may cause complications. The Kalt forceps, forming a cup and without teeth, avoid this difficulty, because you are able to remove the largest amount of anterior capsule possible by any procedure. And yet it is not possible to guarantee that secondary operations may not be necessary on account of wrinkling of the posterior capsule.

Melville Black, Denver. For a number of years I used the cystotome, and it seems to me that after I began to use the capsule forceps I was better pleased than I had ever been with the capsular results. I have used a number of different capsule forceps, but still go back to the Knapp forceps, which is a very convenient instrument to use. The large opening left by the forceps is quite noticeable, and I do not believe I do a secondary operation in ten per cent of my cases. It also seems to me that I have had less reaction after the operation by this method.

F. E. Wallace, Pueblo. I bent Knapp's forceps and made the shaft malleable so that it could be bent in any direction. I made a V-shaped in-

cision at the sides, and then the Knapp opening above. But still in a number of cases we have to have a secondary operation. For a simple wrinkling I think the Knapp needle knife still the best instrument to use; but if we have secondary inflammation some other operation is desirable, such as the V-shaped operation with the Ziegler knife. If the secondary cataract is very dense, then the method advised by Fox is one of the best. Another excellent method is that of Knapp, puncturing the membrane, and then removing a portion of the capsule or iris with the hook.

Edward Jackson (closing). Dr. Knapp mentioned occlusion of the capsule incision. I am satisfied that this occurs. In one case where the lens was extracted for very high myopia, and a large amount of clear cortex was left, it became hazy immediately after the operation. But it was not disturbed for some time, and after some weeks there was a distinct clearing, so that more reflex could be obtained. As Dr. Black says, the removal of the anterior capsule leaves a clearer opening. But I have a good deal of faith in the ability of the eye to deal with remaining cortex. In nine cases out of ten, before many weeks the bulk of the cortex would be absorbed. The eye often continues to clear for a long time, so that the pupil may be clear at the end of six weeks.

I am skeptical as to the opacity arising from the cells of the anterior capsule. I think Parsons is correct in believing it to arise from fibroblasts derived from the iris. The presence of blood as referred to by Dr. Feingold as favoring the development of fibroblasts, is perhaps responsible for some of the thicker membranes. As to the danger of secondary glaucoma from included capsule tags, as mentioned by Dr. Knapp: this is the probable cause in the majority of cases of secondary glaucoma after cataract extraction. There are now enough lenses being taken out in the capsule to furnish valuable information, which we lack, as to the condition of the capsule in senile cataract.

The Capsule in Secondary Cataract Operations.

L. WEBSTER FOX, Philadelphia. My experience leads me to believe that where we have a thoroly mature cataract, secondary complications follow in only about 25 per cent of the cases. It is in the immature cataracts that the percentage is reversed.

Having had the opportunity of seeing the Vienna, French and English methods and practising all of them, I shall briefly describe them in turn.

In Vienna, at the hands of that skilled operator, Mauthner, we were taught to use the Langenbeck knife; a delicate sickle-shaped instrument of which the Ziegler knife is a model. Arlt, Stelwag and Fuchs used knife needles and delicate needles lacerating the capsule by such means.

In Paris, de Wecker, Landolt and Panas had different methods. De Wecker made a vertical incision with a broad knife needle thru the cornea and capsule, one or two lines from the inner margin in the right eye, and on the outer side in the left eye, operating from the front. Then with a de Wecker scissors entering this incision, passing the blade in front of the capsule in the anterior chamber and second blade behind the capsule, with one cut of the scissors making a wide opening in the obstruction.

Landolt and Panas used knife needles as well as the Bowman stop needle.

In London we were taught to follow the method of Sir William Bowman—to use two needles to open the capsule. These needles are now so well known as the Bowman stop needle, that I shall not describe them. Not all the London operators used this method. Some used the modified Langenbeck, others the de Wecker method; but the majority followed the teachings outlined by Sir William Bowman.

Having had experience with all these methods, I have for many years followed de Wecker's teachings, that is making a vertical incision thru the cornea and capsule with what is known as the English broad needle, then snip-

ping the capsule with a small de Wecker scissors.

My reasons for selecting this method are freedom from using force in lacerating the capsule; and no pulling on the ciliary body, which is an important factor in causing cyclitis. That with a single knife like the Langenbeck or Ziegler this complication would probably not take place in a translucent capsule, goes without saying, but it is certainly a factor in dense capsules.

The Bowman stop needle has its advantages, that not much traction is used on the ciliary body in making a clear opening in the media. But the two punctures in the cornea may be two foci of infection and as needles do not cut the cornea but make a puncture which bruises the fibres of the cornea at their entrance, I have long ago discarded this method, as I look upon it as being not without risk, especially in those cases where the primary operation was delayed in healing. Having eliminated all the causes which may lead to trouble, I now only follow the de Wecker method as described above.

Some critics may consider that the vertical incision in the cornea lends more space to infection than the smaller apertures made by the more delicate instruments. In rapidly healing cataracts I take no other precautions than are usually followed in my cataract operations, but in a slowly healing cataract, I add to the usual care of asepsis, a 5 per cent solution of trichloroacetic acid applied to the lips of the incision.

Another important factor is when to perform a secondary operation. In rapidly healing cataracts two to three weeks has been my selection and I have been successful. Where the time of healing has been lengthened, I wait six to eight weeks, and where the patient has 20/40 to 20/50 vision or thereabouts, and there is no particular urgency for reading or near work, I postpone the operation even up to six months. I wish to state that I take all the precautions for this operation that I do in the primary cataract operation.

Observations on Refraction.

This paper, read by I. W. Haughey, is published in full on page 197.

DISCUSSION: W. H. Crisp, Denver. The most difficult problem in connection with refraction is the teaching of the subject. Most men are given a very small amount of initial teaching, and are then left to "pick up" the work for themselves. The only way to get a proper general training of refractionists is to give a great deal of individual instruction in each case. This of course can only be satisfactorily accomplished by spending a great deal more money on the teaching of refraction than is done at the present time. Unfortunately, leading refractionists do not even agree thoroly as to methods, either in examination or in prescribing.

The principal errors in refraction work are: (1) undercorrection of hyperopia and astigmatism; (2) inadequate precision in ascertaining the axis of an astigmatic correction; (3) carelessness in balancing the amount of correction given for each eye; and (4) the overcorrection of myopia, or the substitution of a myopic correction for a hyperopic.

The frequency of occurrence of latent hyperopia is commonly overestimated. In the majority of cases which I examine there is really no latent hyperopia, that is to say no hyperopia which cannot be discovered without the use of a cycloplegic, if sufficient care and proper methods are employed. A great help in the revealing of the full amount of hyperopia, and one by no means generally resorted to, is bilateral fogging. It is often possible by simultaneous fogging of both eyes to discover a considerably greater amount of hyperopia than is found by unilateral fogging. By bilateral fogging, moreover, one is able to balance the two eyes much more accurately, in the very usual type of case in which visual acuity is possessed by both eyes.

The problem of the correction of what most men call latent hyperopia is really the problem of obtaining gradual relaxation of accommodation. I have found few patients who were

really conscientious in constantly wearing their lenses who were unable finally to relax their accommodation for a full correction of hyperopia. But persistence is absolutely necessary for this, and cannot always be obtained. I do not agree with Dr. Haughey as to the correction of hyperopia in children, as in a great many instances its full correction is just as essential as in adults. In children, moreover, a full correction of all the hyperopia found, even under cycloplegia, is usually much more readily tolerated than in adults.

Whether hyperopia is the normal condition or not, it is unquestionably capable, even in small amounts, of producing marked symptoms which are ordinarily completely relieved by its correction. Since on looking away from close work the hyperopic eye is unable to obtain that condition of rest which is obtainable by the emmetropic or properly corrected eye, even moderate amounts of hyperopia represent in my opinion an imperfection of adaptation of the eye to modern requirements.

A half meter is a very convenient distance for retinoscopy, and a convenient way to check one's distance from the patient is to have a string a half meter long attached to the retinoscope. As regards the wearing of tinted lenses, I agree with Dr. Haughey in the main, and am further of the opinion that most people who demand tinted lenses do so because they have been incorrectly refracted. The accurately refracted eye is not ordinarily unduly sensitive to changes of light, altho during very long exposure to intense light the tinted lens is a comfort.

Edward Jackson, Denver. Two recent cases suggest the inability of some ophthalmologists to think that there may be anything unusual in a particular case. One was that of a woman who was doing close work, wearing a plus 4.50 diopter correction, and yet with the bilateral fogging method mentioned by Dr. Crisp she took 5.50 diopters. The only way to succeed in diagnosis is to assume that

the case is an unusual one, and to be sure that you look well beyond the possibilities of it.

J. L. Sutherland, Denver. I find that the personal equation is important in many cases. I did not hear the essayist say what he would do in a case of hyperopia in one eye and myopia in the other. I have had two cases of this kind within the past few weeks. In one case of this sort the patient had been unable to wear the lenses previously given, and I corrected each eye just as I found it, with the result that she has been comfortable for three months. I am sorry to read in our journals of ophthalmology so many diverse opinions of many men, especially in the same issue of the paper. If we are sure we are right in the measurement of hyperopia I believe we should give the full correction in every case.

Melville Black, Denver, compared refraction with fishing, and suggested that there were only born refractionists and only born fishermen, and that the two qualifications were not always combined in the same person. He had used for many years the method of estimating astigmatism described by the author of the paper, and believed to be a first class method.

F. E. Palmer, Sterling, Colorado, described a case of marked astigmatism in which he had seemed to get better results by the correction of astigmatism in the same eye at two different axes by means of cylinders ground on either side of the same lens.

I. W. Haughey (closing). As regards the correction of latent hyperopia my remarks applied only to the young, as after thirty-five years of age I believe the full correction should usually be given. The total hyperopia and the total myopia should in my opinion be thoroly corrected in such a case as mentioned by Dr. Sutherland. I have usually got about 0.25 more sphere with the retinoscope than with the chart.

Tuberculosis of the Eyes in the Army.

H. H. STARK, El Paso, Texas, read the paper to be published later.

DISCUSSION: Edward Jackson, Den-

ver. Dr. Stark's paper illustrates one of the very striking medical aspects of the war, at least as regards their incidence in young men. We have learned frequently the prevalence of many conditions that we did not have reliable statistics on before. This probably applies more to tuberculosis apart from pulmonary tuberculosis than to most other conditions that have been studied. The difficulty in the study of these cases is the brevity of the time that the patients were under observation. To get an idea of the complete course of such cases we shall have to rely chiefly upon cases seen in private practice. I have a case in which five years ago Dr. Knapp made a diagnosis of ocular tuberculosis in New York; and who later came under my observation in Denver, altho he has not been deemed a generally tuberculous patient.

In the cases which Dr. Stark had time to detail, the thing that struck me was the occurrence of what we should formerly have regarded as an acute iritis. We should look for syphilis very persistently in these cases, altho often that is the wrong direction, and the search is a waste of energy. We have not yet a very broad conception of the causes of acute iritis. Quite possibly in these acute cases we ought to think equally of tuberculosis as the cause. With reference to the tuberculin treatment, the point brought out by Dr. Stark as to only treating these cases once a week is very important. The improvement he had is exceptional and one that I have not had in any case. Our attitude with reference to tuberculosis will have to be that we are not certain of the cure until the patient is dead, and that we must look out for recurrences for years to come.

W. C. Finnoff, Denver. The experience of most ophthalmologists has been that it has taken a long period of time before any improvement was noticed. The great principle is cautious injection of tuberculin and observation of the retina following injection. If the injection is too large we are liable to have large hem-

orrhages and generally increased disturbance following the injection.

Arnold Knapp, New York City. Are we not remiss in these cases in not trying to find out a little more about the primary lesion? The previous history of the patient is of great importance, and another detail which we have overlooked is X-ray examination of the chest. I do not think we ought to make a diagnosis from the tuberculin test unless we get an actual reaction in the eye. Rapid improvement after injections is a cause for suspicion, that we have overlooked the true etiology. In many of these cases we have probably to do with more than one cause.

J. A. Patterson, Colorado Springs. Some of the first work in this country on X-ray examination of the chest was done by Solly of Colorado Springs; and it has now become a routine practice among the men of Colorado Springs who do tuberculosis work.

Dr. Stark (closing). I fear I have often persisted with treatment for syphilis when the condition was really tuberculosis. I believe with Dr. Knapp that we must not depend merely on the temperature and the skin reaction; but must have with these the reaction in the eye. All my cases in private practice are gone over by an expert, and where he thinks there is any doubt an X-ray of the chest is made.

Unusual Fundus Condition.

W. C. FINNOFF read the paper published p. 161, and exhibited the sketch reproduced in Plate III.

DISCUSSION: Marcus Feingold, New Orleans. If I had not asked Dr. Finnoff beforehand whether his picture represented a direct view of the fundus, I should have said that I had seen similar cases before in my own practice and in the literature. The cases in the literature, and those which I have seen, are all directed downward; and they are easy to explain if we think of the embryonic cleft in the choroid, but to explain Dr. Finnoff's case is much more difficult. It has been proven that the eye during development rotates in the orbit, so that

the cleft is temporarily turned in some instances, but it is hard to believe that the eye might have made a rotation upward of one hundred and eighty degrees. (See page 161.)

Observations on Trachoma.

L. H. BUXTON, Oklahoma City, reported some of his personal experience with trachoma.

DISCUSSION.—J. J. Pattee, Pueblo. As to the doctor's statement about the high percentage of errors in data pertaining to the incidence of trachoma, my experience and observation, tho limited, correspond with his. For five years I practiced at a miners' hospital at Gallup, New Mexico, near the Navajo Indian Reservation. I saw many Indians from the reservation and a number worked for the company I served. There were many cases of external eye affections, including some trachoma, but most of the cases were old standing neglected conjunctivitis and blepharitis. Trachoma was not more frequent than among other races correspondingly dirty and unhygienic. The type of physician employed to care for the Indians was, as a rule, one who knew very little about the eye and whose duties were general practice and administration. Great reliance should not be placed on their figures pertaining to trachoma.

Trachoma should be carefully diagnosed. If a child is excluded from school, if a man is excluded from employment by an industrial organization, or if a patient is refused admission to a general hospital on the ground that he has trachoma when in reality he has only a conjunctivitis, we have imposed an unjust burden upon the man and the community also suffers.

Many physicians, nurses, and laymen have an undue fear about so-called "granular lids," and they deprive suspected cases of privileges enjoyed by others.

J. B. Potts, Omaha. The doctor's statements about coincide with our observations of trachoma around Omaha, in the Indians and others. A squaw will come in with her husband, and he

does not have trachoma and the children do not have trachoma, but she has had it for many years. Dr. Gifford once squirted some trachomatous material into one of his own eyes and promptly developed a pannus, which it took two years to get rid of. We always have a crop of it after the threshing season. There is a form of conjunctivitis with a very profuse growth of granules, but it is not trachoma at all.

I. W. Haughey, Aurora, Nebraska. It may be that there are two or three agents producing similar symptoms, all of these resulting cases being classified as trachoma. In my own cases I usually find trachoma in the other members of the family of a patient who has had the disease. It was reported from Lincoln, Nebraska, that fifty to ninety per cent of the school children had trachoma. They were probably reporting, as trachoma, cases similar to what I got in my own practice, which get well readily on scraping and the use of copper sulphat. They may be trachoma or they may not, but if not I do not know what to call them.

L. H. Buxton (closing). My stereotyped method of treating ordinary cases of trachoma is: first expression, crushing the large majority of the granules, destroying the trachoma bodies, but remembering that you can not do this in one application; the patient must be in my office every day; the first day after expression I scrape the lids thoroly with gauze, and each day after that; in the meantime if there is any necessity for using the forceps again I do it; and the patient does not have irritated eyes. Under this treatment you will find that the pannus is getting better, the lids getting thinner. The strange thing about copper, used right along, is that the second month is painless. I give it to the old Indians and if they follow instructions and rub their lids every day they can cure their trachoma.

Growths on Inner Surface of Each Eyelid.

ROBERT FAGIN, Memphis, presented a patient, the report of whose case will

be published subsequently. The microscopic examination of a piece of the tissue was reported by Dr. Finnoff.

W. C. Finnoff, Denver. The sections from the tumors consist almost entirely of small round cells which resemble lymphocytes. The arrangement of the cells is similar to that of the germinating centers of lymph nodes. A few fibroblasts are present. They send out fine reticular strands which support some of the cells. The remainder of the cells are held together by a delicate intracellular cement substance. Several capillaries, which are made up of a single layer of endothelial cells, are seen thruout the tumor. There is a small triangular strip of stratified conjunctival epithelium in one corner of the section. The tumor cells invade the whole subepithelial tissue.

From the location of the tumors and the microscopic appearance of the sections, I would classify the tumors as lymphomas.

DISCUSSION.—Arnold Knapp. The condition would probably react unusually well to the X-ray and radium. The cells are exceptionally young in character, and I would suggest the application of the X-ray.

Edward Jackson, Denver. The first thing I thought of was hyalin changes in the lid, but the lids are free from scarring; and on seeing the sections there can be apparently no question as to its nature. I believe it would be a good case for radium in rather large doses, say from thirty to fifty millicuries. I think this is more promising than internal treatment with arsenic.

Melville Black, Denver. Outside of radium, the only thing that occurs to me would be the fulguration spark, which could be easily applied. If the application of these two agents does not produce results I should be in favor of letting the case alone.

E. R. Neeper, Colorado Springs. My experience with the use of the fulguration spark on isolated nodules of vernal conjunctivitis, was that the result was an increase rather than a decrease in the size of the nodules.

Hypotony After Trephining.

ARNOLD KNAPP, New York City, read the paper published in full, page 88.

DISCUSSION.—Edward Jackson, Denver. My experience in trephining has been very limited. I have had no case that remained below ten millimeters for more than a few weeks. The nearest approach to anything of this kind was in the first eyeball I trephined, where the tension remained below twelve millimeters for several weeks and was below fifteen millimeters after eight years. In that case there has been no marked deterioration of the eye. It was a blind eye in the first place, a case of simple glaucoma. The most rational explanation of postoperative iritis has seemed to be that it was the result of prolonged reduction of intraocular pressure. And yet the tension in such cases was often not so low as that of my case. It is probably well that we have a method by which the tension of the eye can be permanently reduced below normal in glaucoma, because I believe the changes in glaucoma are due to a change in relation of tension to nutritive processes rather than absolute increase in tension. We have cases of glaucoma in which the deterioration goes on while the tension is down at the normal level.

Melville Black, Denver. Does Dr. Knapp feel that the trephine opening in each of his cases was as far forward as he would have liked to have it? The posterior position of the opening seems a possible explanation of the persistent hypotony. Is the detachment of the choroid a thing that may occur and be only temporary? I have never personally seen a case of persistent hypotony. The tendency in all of my cases has been either to normal tension or to moderate increase in tension. It has seemed to me that in all the trephine failures I have had the opening was not far enough forward on the cornea.

Robert Fagin, Memphis, Tennessee. Will Dr. Knapp tell us his experience with the Lagrange operation, and whether he has had this hypotony after the Lagrange operation?

Dr. Knapp (closing). I think the question of hypotony and the intro-ocular circulation is a very important phase of our study of the subject. Personally I look upon a case with an enormously large ectatic scar and minus tension with a good deal of trepidation. I do not think that choroidal detachment has anything to do with prolonged softness of these eyes. I think you will find choroidal detachment present in the majority of these cases. I have never seen a choroidal detachment remain permanent. In trying to get a complete iridectomy in these cases I may make too much traction on the iris. As to the position of the trephine opening, Collins has shown that the success of the filtration depends upon making a complete cut in Descemet's membrane. I am further very careful to separate the superficial layers of the conjunctiva from the cornea. I have never got hypotony from a Lagrange, in fact rather a hypertony than a hypotony. I limit the Lagrange operation to cases which I get early, in which by the use of drops I can get the tension below thirty millimeters, and in which the iris is not degenerated.

WM. H. CRISP,
Recording Secretary.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA

November 20, 1919.

DR. WILLIAM T. SHOEMAKER,

CHAIRMAN.

Operation for Draining Lacrimal Sac and Nasal Duct into the Unciform Fossa.

DR. HARRIS P. MOSHER, of Boston, read by invitation a paper describing the operation devised by him for this purpose, with a review of the anatomy of the parts involved. (See LARYNGOSCOPE, v. 25, p. 739.)

DISCUSSION. Dr. S. Lewis Ziegler said that the ingenuity and practicability of Dr. Mosher's operation should receive our commendation. There is no doubt

that a patulous tear duct can be secured in this way. West's window resection operation and Yankauer's operation also accomplish this result. There is, however, a certain physiologic drawback in all these operations. The normal capilarity of the lacrimal canal is interfered with and forcible regurgitation of septic secretions cannot be prevented when the nose is blown. This fault was also present in the older technic of extreme dilatation so frequently repeated that atrophic degeneration of the lining of the overpatulous tear duct finally occurred. Many years ago he saw two extreme examples of this latter method in which infection of the cornea, perforation and emptying of the anterior chamber would occur overnight. This accident was liable to happen at any time, and was repeated many times while the patients were under his care. Strange to say these ulcers were clear and left but slight traces of the process, while the vision was but little disturbed.

Excision of the lacrimal sac has not proved as successful in cases of dacryocystitis as one would like to see. He had several times been called on to do corrective operations where slight infection of the wound and subsequent contraction of the scar had caused a mild ectropion. This he corrected by his galvanocautery puncture operation. In other cases in which the epiphora proved annoying he performed rapid dilatation of the atresic lacrimal canal, *pro forma*, as tho no previous operation had been done and then introduced a lead style for the tissues to heal around, somewhat like the metal ring inserted in the perforated lobe of the ear when planning to wear earrings.

Dr. Ziegler still believes that rapid dilatation of the lacrimal canal *ad maximum* and without incision of the tissues is the best treatment for the great bulk of obstructive lesions of the tear duct. He recently saw two young ladies, aged twenty-one years, for whom he performed rapid dilatation (up to No. 12) when they were about two weeks old. Examination showed a physiologically patulous tear duct, permanently preserved.

He had the opportunity of seeing a

number of Dr. West's operative cases when he was working in the clinic of Dr. Silex, in Berlin. He could not see that the results were better than with rapid dilatation. But he did come to the conclusion that whatever the treatment used in order to correct the lacrimal lesion a skilled rhinologist is required to coöperate in order to improve the ventilation of the upper air chamber, the drainage of the sinuses and the hyperesthesia of the nasal mucosa. In this way only can the chemically irritating and bacteria-laden hypersecretions be reduced to a normal and nonirritating condition and the physiologic balance between the nose, tear duct and eye be restored. The hyperesthetic area over the septal tubercle is the "eye spot" of the nose. By sympathetic reflexes it controls the sinus secretions. Cauterization of this area will therefore greatly reduce all such hypersecretion.

Dr. Zentmayer: It was very disappointing to learn that after the intranasal operation, as described by Dr. Mosher, probing at irregular intervals over an indefinite period is necessary to maintain drainage. It may be said for the operation of excision of the sac, that when the procedure has been properly done, treatment of the condition is at an end. It is true that, for a time, in most cases, the epiphora following the operation is annoying, but this gradually lessens and in most cases finally ceases. If after the intranasal operation probing is still required he saw no advantage in doing the operation, and believed it would gain but few advocates.

Dr. G. Oram Ring: No intranasal operation of the West type or its modifications would ever entirely take the place of lacrimal sac excision—notably in those cases of chronic lacrimal disease associated with cataract or corneal ulceration. He recalled a visit to the Silex Clinic, Berlin, which he made during 1912, at which time it was rare not to see several cases of extirpation of the sac daily. A visit to the same clinic two years later found Dr. West doing his operation at the same clinic largely to the exclusion of all others.

The method at that time was on trial, but the conviction was expressed by most

of the nose and throat men connected with the Berlin Polyclinic that the nasal opening made was not likely to be permanent. They insisted on waiting at least a year or two before giving their approval to the procedure.

Dr. Posey: Meller's publication of his bloodless method for the removal of the lacrimal sac had converted that operation from a most unsatisfactory one to one of the most satisfying and interesting operations in ophthalmic surgery. He said he deviated but little from the precise directions laid down by Meller, substituting a 2 per cent. solution of novocain for cocain as being less toxic and making use of an ordinary hypodermic syringe instead of the Pravaz instrument.

Dr. Posey makes the internal palpebral ligament a valuable guide, realizing that he will find the sac lying directly beneath it. He dwelt upon the importance of the removal of every piece of diseased tissue connected with the sac also of a thoro curettement of the canaliculi. The scarring observed several months after the operation is negligible.

Dr. Posey advocated the removal of the sac in all cases in which there is a mucopurulent discharge from the sac and in all mucocoeles in which pressure fails to squeeze out the contents of the sac either into the nose or the conjunctival cul-de-sac; also of all infected sacs prior to any operation which necessitates an incision into the globe; also of all cases of neoplasm or suspected neoplasm of the sac.

The results of the operation, in so far as it removes the source of the irritating and annoying discharge into the conjunctival cul-de-sac, are usually very satisfactory. Tearing, after psychic or mechanical irritation of the lacrimal gland, is the most patients complain of, and this varies according to the nervous susceptibility of the individual.

Dr. Posey said he had never had recourse to removing the lacrimal glands to relieve this lachrimation, the watering of the eye generally subsiding after a time, so that it annoyed but little. Dr. Posey said that while removal of the sac gets rid of the diseased structure, it does not restore the lacrimal apparatus

to its normal condition. Indeed it annihilates for all time the excretory mechanism. Any operation, therefore, which opens up the lacrimal passages and maintains them in a patulous condition, should be given a fair trial, and he proposed in the future to refer suitable cases to rhinologic colleagues for a trial of Dr. Mosher's procedure.

Pathologic Histology of Excised Lacrimal Sacs.

Dr. G. E. DE SCHWEINITZ. Extirpation of the lacrimal sac is an operation of ancient lineage. Celsus recommended that the sac should be removed down to the lacrimal bone, which was subsequently touched with the point of a glowing iron. The same operation was commended by Galen and by Paulus of Aegina, both of whom declare that many surgeons in its performance bored thru the *os unguis* into the nose, the ancestor, perchance of those operations which in our day establish an intranasal drainage. Berlin, in 1868, gave the first impetus, in comparatively modern times, to the operation of extirpation of the lacrimal sac, now commonly and successfully practiced in many suitable cases.

His experience with this operation was a fairly large one and from it he concluded:

1. It is a good operation if its technic has been correct.

2. For a week or two the epiphora may be annoying; subsequently it markedly lessens, and sometimes practically disappears, unless the patient is exposed to wind or irritants.

3. The lessening of the epiphora does not depend upon atrophy of the lacrimal gland, but upon the disappearance of the irritation to which this gland had been subjected prior to the extirpation of the sac by infectious conjunctival secretion.

4. According to C. R. Holmes there is no serious objection to removal of the lacrimal gland in the event of continuance of annoying epiphora, and none to ablation of the palpebral portion of the gland, which is not without value in these circumstances.

5. Extirpation of the sac is of less favorable result in children than in adults, and adaptation is quicker in those

patients who prior to the operation have had complete stenosis of the duct, and in whom the overflow of tears has been correspondingly great.

The pathologic findings in excised lacrimal sacs have been often recorded. A personal research in this regard made some years ago confirmed other observations of other surgeons, referring now to various types of so-called chronic dacryocystitis. In general terms the excised tissue exhibits some form of chronic catarrhal inflammation of the sac or else acute hemorrhagic and purulent inflammation. The results of a number of these examinations may thus be summarized:

The epithelium lining the sac may be intact over its surface, but upon it are exudations of leukocytes or marked leukocytic infiltration between the cells; the mucosa is usually densely infiltrated with small round cells, sometimes massed, with eroded and degenerated epithelium over them. The fibrous coat of the sac usually shows intense injection of the vessels with hemorrhages adjacent, and areas of embryonic connective-tissue formation. In the lymph spaces of the fibrous coats the endothelium may be thickened and proliferated.

Examination of the periosteum, as in a fragment recently removed in these circumstances shows fibrinous and hyalinized connective tissue, vascular engorgement and profuse lymphocytic infiltration, which is especially marked in the perivascular regions.

Perfectly willing to be convinced that other methods than extirpation of the sac are more satisfactory, and some of the intranasal operations hold forth fair promise, it was difficult for Dr. de Schweinitz to believe that anything but a radical removal of tissue diseased as it exists in chronic dacryocystitis is entirely satisfactory. Certainly in certain ophthalmic conditions it became almost obligatory, *e. g.*, to aid in the treatment of serpent ulcer of the cornea and to render safe operations on the ocular bulb when the sac is inflamed and pussecreting.

J. MILTON GRISCOM, M.D.,
Clerk.

ST. LOUIS OPHTHALMIC CONFERENCE

December 12th, 1919.

DR. WM. F. HARDY, Presiding.

Determination of the Axis in Astigmatism.

DR. FREDERICK E. WOODRUFF said:

One of the greatest difficulties in doing accurate refraction work is the determination of the presence or absence of astigmatism, and its amount, if present. Before the amount of astigmatism can be ascertained with any accuracy, the axis of the cylinder must be determined with as much certainty as may be possible.

Where there is any doubt as to the presence or absence of astigmatism much light can occasionally be shed by the use of the stenopeic slit. It is needless to explain the nature of this aid in our work and it is my purpose only to call attention to it and to urge its more general use.

When an approximate correction has been made of the hyperopia or the myopia by using spherical lenses; then, by the addition of the slit in a revolving cell of the trial frame, it may be determined very readily whether the vision may be improved in the various axes by slowly revolving the slit thru these axes. When the vision has been apparently improved in any axis, then, by the addition or subtraction of spherical lenses it may be determined whether the greatest acuity has been obtained in this axis. When this has been done again revolve the slit slightly in either direction and ascertain whether the first position was the exact axis of greatest or least refraction. When the correction in this axis has been obtained, then revolve the slit ninety degrees and by the addition or subtraction of spherical lenses again get the best acuity possible. When these two corrections have been made, remove the slit and put on a correcting combination that will represent these two measurements. This is not the end, for even here we may have to add or subtract from our combination. This method of procedure will very

often save one from the error of considering a mixed astigmatism to be a case of simple astigmatism. It also assists very materially in the determination of the correctness of any refraction. The more this slit is used the more one learns to rely upon it; as an ally, however, rather than as the sole method.

I wish to call attention to another method which has proven of the greatest advantage in the determination of the exact axis in astigmatism. After the best obtainable vision is secured by placing before the eye the combined lenses, remove the cylinder and replace it, in the supposed axis, by a cylinder a half dioptre, or more, stronger; then, by rotation, determine whether or not the vision is improved. With an intelligent patient permit him to rotate the cylinder in order to secure his best acuity. Then replace the proper cylinder in the new axis, which will prove to be the correct one. This method was called to my attention by Dr. W. B. Post of Carthage, Mo., and I have made most satisfactory use of it for a number of years and have not been disappointed in the results obtained. I have been unable to find reference to this method in the text books.

DISCUSSION.—Dr. Wm. H. Luedde stated that the essayist's insistence that the visual acuity is the final test for accuracy in the correction of astigmatism coincides with the practice of the late Dr. John Green. Altho Dr. Green was the originator of a number of standard test cards for the measurement of astigmatism, during his later years in private practice, he rarely referred to them but depended more on the direct application of ophthalmometer measurements, and the effect of cylindric lenses on visual acuity. However, there is no reason for any ophthalmologist to limit himself to any one method; measurements should rather be checked by confirmatory test in a variety of ways.

With regard to the position of cylindric lenses, it is rarely found necessary to select an axis which is not a multiple of five. However, in a few cases

the determination of the axis within one or two degrees seems to be of practical importance for the comfort of the patient.

Dr. H. S. Hughes. Most test cards are placed too high. If the test letters are about 2 feet from the floor, the direction of the gaze is slightly downward and the eyes will be more comfortable than when the gaze is directed horizontally or upward. Another point: objects in or near the line of the test range should be eliminated; as they distract the patient's attention.

Dr. W. E. Shahan stated that, personally, he had more confidence in astigmatic charts than in other means of measuring astigmatism.

Dr. John Green inquired as to the width of the stenopeic slit, and as to whether Dr. Woodruff's use of the slit was confined to tests under cyclopegia or not?

Dr. F. E. Woodruff, replying to Dr. Green, stated the slit is used in testing *both* with and without cyclopegia.

Dr. E. H. Higbee has used the stenopeic slit in testing a great deal; but of late, for no particular reason, he had not used it at all. He recognized the value of the method, and thought Dr. Woodruff's suggestion of using it more will no doubt lead to the determination of axes with a greater degree of accuracy. He always rotated, or had his patient rotate, the cylinder and found that they very often preferred the axis at from 5 to 10 degrees away from the one they designated upon the chart.

Dr. J. W. Charles. In the test with the cross, after the axis has been found, the patient should be cautioned not to attempt to make the lines alike, but simply to say *when they become alike*; many patients try so hard that, altho both meridians may be adequately corrected, they actually, by reason of attention to one or the other line, see one more plainly than the other.

Dr. John Green stated his opinion that in many cases not all the astigmatism could be corrected with comfort to the patient, at least, when the first glasses are ordered. Later they may accept with satisfaction all or nearly all.

Case Reports:

DR. J. W. CHARLES. A case of *injury to an eye by a tennis ball* (1907) in which there was at first a hyphema with large pupil. When the media had cleared there was an exact simulation of a rupture of the choroid but with vision of 19/30. In 1908 the vision was still 19/30. The patient disappeared for two years, when the vision was found to be 19/15 and the exudate near the macula had vanished except for traces of pigment. The pupil is still slightly larger than that of the other eye but accommodation is sufficient for reading.

The next case was that of a bookkeeper who had never seen well with his right eye. His best vision was 23/75. Under mydriasis the ophthalmoscope yielded a picture almost exactly like the first illustration of Major Middleton's article on "*Hole of the Macula*" (Am. Journ. Ophth. Nov. 1919).

The third case was that of *embolus of the arteria centralis retinae*. The patient, a coal miner, was attempting to collect from the Illinois compensation commission for an accident, but confirmed the diagnosis by dropping dead three weeks after the examination.

DISCUSSION: Dr. T. L. Post, in reference to Dr. Charles' second case, questioned whether this could be a genuine one of "*Hole in the Macula*" because of the good vision.

Dr. F. E. Woodruff recalled a patient with a hiatus in the retina, so close to the macula that the diagnosis of "*Hole in the Macula*" was made, but in this case the vision was very good.

Dr. W. H. Luedde stated that the possibility that atrophic changes near the macula may not be due to traumatism, must be remembered; especially in those cases where a claim for damages is pending. Such an examination recently showed slight marks of external violence on the left eye, but it was the right eye in which vision was apparently diminished by a lesion at the macula. Re-examination after several months revealed further extension of the macular lesions and the development of hyalitis. A large old retino-choroidal scar, an-

terior to the equator in the affected eye, and a positive Wasserman reaction gave additional cause for the rejection of the claim that the loss of vision was the direct result of traumatism.

Dr. John Green, Jr., read the collective abstract "*Hygiene of the Eye*" (Published in the Amer. Jour. Ophthalmology, Dec. 1919).

JOHN GREEN, Jr.,
Secretary.

BALTIMORE CITY MEDICAL SOCIETY, OPHTHALMIC SECTION, CLINICAL MEETING

December 17, 1919.

Dr. E. A. Knorr, presiding.

Hemorrhage in Vitreous.

DR. H. FRIEDENWALD presented a case of a young man who, a few weeks ago, suddenly developed a large hemorrhage in left vitreous, and at time of first examination vision was limited to hand movements in this eye. At this time the case presented no unusual features, but later became interesting on account of the rapid absorption of the blood and the development of the connective tissue at upper periphery of retina. This gave the appearance of a localized detachment of the retina, but the retina, he believed, was not really detached. A retinal vein appeared to leave the plane of the retina, reach far out into the vitreous and enter the mass of connective tissue, but the return of both sides of the vein seemed to be in the proper position. The hemorrhage probably came from one of the peripheral retinal arteries. The case belongs to that interesting group of vitreous hemorrhage seen in young people. In this condition there is a great tendency to recurrence. In the cases he had observed there were peculiar vascular changes: a number have shown corkscrew vessels; and in all there was a tendency to connective tissue formation which seemed to be the result of the hemorrhages. In recent years tuberculosis has been regarded as the causative factor.

Bilateral Punctate Retinitis.

DR. FRIEDENWALD also presented the case of an old colored woman, with punctate retinitis of both eyes with some recent retinal hemorrhages in the right. The spots were small and white, sharply circumscribed and, at some places, confluent. The urine and the blood showed nothing abnormal. The sole pathologic condition was probably arteriosclerosis. The diagnosis, retinitis punctata albescentis described by Mooren forty years ago, who considered it an aberrant form of retinal degeneration without pigmentation. Several cases have been reported in which there was night blindness, contracted field of vision, symptoms of pigmentary degeneration of the retina but without the pigment.

A second condition to be considered has been termed guttate choroiditis or verrucosities of the choroid. A few cases of this kind have been examined pathologically, and extensive areas in the choroid were found covered with these spots tho there was little visual impairment. In the case presented here, the vision is very good in the left eye, there are no pathologic changes in the optic nerves. Nettleship claims to have no difficulty in differentiating the two types described. Dr. Friedenwald considered the spots identical in both forms, and the evidence of a degenerative process, whether allied to pigmentation, degeneration, general arteriosclerosis, or when found in phthisis bulbi, it mattered not. It is probably a mistake to look upon the "white spots" as the essential trouble.

DISCUSSION.—Dr. Knorr wanted to know what relation the recent retinal hemorrhages had to the punctate retinitis.

Dr. Friedenwald considered the whole process to be one of a chronic degenerative nature, due to arteriosclerosis.

Stellate Opacity of Crystalline Lens.

DR. FLECK presented a young soldier who had a slowly developing stellate opacity of each lens with progressive impairment of vision. Vision right eye was

5/200 and left eye 8/200. Dr. Fleck presented this case principally to obtain an opinion as to the advisability of doing a needling of the lens.

DISCUSSION. Dr. Friedenwald was of the opinion that the lens should be operated on if no fundal lesion was found as a factor in producing the visual impairment.

Rupture of Retina from Contusion.

DR. FLECK also presented a soldier who had been injured in action by particles from a high explosive shell. Some fragments of the shell caused a laceration of the left lid, contusion of eye ball with a rupture of retina at left macular region exposing the underlying choroid. The case was interesting, as most cases of this type produce other extensive lacerations of the choroid and this destruction was limited to one spot.

Retinitis Pigmentosa.

DR. KNORR explained a case which had been under treatment for the past twelve years, during which time there had been little change in the condition. The case presented classic symptoms of pigmentation at the periphery of retina, beginning optic atrophy, night blindness, impaired visual acuity, a postcortical cataract, and characteristic ring scotoma. He was unable to find any definite cause for the condition. No relationship could be found between intermarriage of families.

Chronic Trachoma.

Dr. Knorr also showed three cases of trachoma in which the tarsal cartilage had been resected. All cases showed a good result.

DISCUSSION. Dr. Johnson stated that at Fort McHenry they had done quite a number of resections with favorable results. He considered the indications for operation: Thickened cartilage, corneal ulceration with pannus. In their operative technic a double arm suture is brought out and tied over the lid to preserve a permanent correction. Most all cases had been done under a local anesthetic with injection of novocain, the operation being practically painless. After the operative procedure a 1-400 bichlorid solution is rubbed on under surface of lid.

Dr. Fleck was impressed with the ease with which the mucous membrane could be separated from the cartilage after the injection of novocain.

Hemorrhagic Retinitis From Infected Tonsils.

Dr. LOOPER presented a case of a young medical student who had consulted him on October 21, 1919, regarding impairment of visual acuity in right eye. A few days before when looking thru a microscope he noticed blurring of the image, and the appearance of definite spots in his eyes. Examination showed a severe hemorrhagic retinitis of each eye, but more advanced in right. Vision right eye 1/10, left eye 2/10 with no improvement by refraction. Examination of throat showed badly infected tonsils, anterior cervical glands enlarged. Patient was sent to the hospital for the purpose of a thoro examination by an internist, who could find no cause for the condition. Blood pressure was normal, several careful urinalyses were negative, complete blood picture normal, Wassermann

negative, X-ray of sinuses and teeth negative, complete physical negative, except infected tonsils.

October 26, 1919, tonsils were removed, and after one week patient began to improve. The hemorrhages slowly disappeared, and at the end of a month vision was normal in each eye, hemorrhages had completely disappeared, of which there has been no recurrence to date. Patient has gained four pounds in weight, color is gradually improving, appetite good and he feels very much better in every respect.

DISCUSSION. Dr. Friedenwald thought the case was very interesting, as hemorrhagic retinitis at this age is very unusual as well as for the rapid disappearance following the excision of the tonsils.

Dr. Knorr mentioned the association of the teeth and sinuses to retinal hemorrhages and was glad to hear and see demonstration of the infection from the tonsils being a causative factor.

EDWARD A. LOOPER,
Secretary.

ABSTRACTS

Keyser, Geo. Ophthalmia Electrica from the Manufacture of Calcium Carbide.—Norsk Magazine for Laegevidenskaben, March, 1919.

The author's cases all occurred during a test run of a new electric oven of unusual size at a carbide factory at Aalvik, Norway. Carbide is made by heating coke and quicklime together in an electric oven at a temperature of 2400° to 3400° Centigrade. Flashes of strong light due to accidental short-circuitings are thought to be the cause of the ophthalmias. Out of 12 men attending the oven in the night of August 3rd, 1918, 5 had symptoms of ophthalmia coming on within 2 or 3 hours after leaving the oven. None of the men affected had worn any protective glasses.

Four of the cases were of a milder type and presented identical symptoms: marked pain in the eyes, marked photophobia and blepharospasm; lids

slightly swollen; conjunctiva much injected; cornea negative; pupils equal with a weak reaction to light; no examination of fundi; vision normal. Treated with one or two instillations of cocain solution (2%), these patients recovered in a few minutes.

The fifth case presented the same history but the symptoms were more marked. In addition the patient complained of the appearance of a vibrating golden-yellow line, seen at some distance and noticed whether the eyes were closed or open; it would disappear at times and be substituted by a blank space in which nothing could be seen. After the instillation of a few drops of cocain solution the pain and spasm disappeared but the yellow line still remained. On attempting reading, the patient could see that there were letters, but could not tell what the words were. (Central-paracentral scotoma). After 24 hours the golden

line became weaker and the vibrations slower; in 36 hours the line was gone and the vision proved normal. There was complete recovery in all the cases.

D. L. T.

E. Ehnhuus. Lesions of the Eyes as a Result of X-ray Treatment.—*Hospitalstidende*, Vol. 62, P. 1228.

The patient was a man of 67 with a carcinoma of the inner canthus of the right eye, which showed a few excrescences on the caruncle and on the plica semilunaris. Vision and fundus normal. From December, 1911, to December, 1912, he received 9 X-ray exposures with a hard tube, the eyeball being covered with lead. The next to the last exposure happened on the 14th of November, 1912: on the last of December, 1912, at the last exposure the patient stated that for a month the vision had been reduced and there had been lacrimation, photophobia and some secretion in eye. Vision 20/70. Examination revealed a marked injection of the bulbar conjunctiva. Cornea, iris and lens normal; optic disc blurred. Above and below disc yellowish white plaques on the retina in size about $\frac{1}{4}$ of that of the disc. Above and temporally, a peculiar flaming reddish-yellow appearance with diffuse pigmentation. On March 19, 1913, the external injection had all disappeared, the plaques on the retina were still present, but were whiter and atrophic, with pigmentation un-

changed. Vision had returned to normal.

D. L. T.

Moreau, F. So-called Psychic Blindness.—*Ann. d'Ocul.*, 1919, v. 156, p. 156.

The author defines this condition as blindness caused by an unknown mechanism, under conditions of great excitation, not accompanied by ophthalmoscopic lesions, and progressing towards cure without therapeutic measures. He reports such a case. The patient was under intense bombardment for 5 hours but was unharmed. However, he was greatly excited. Next day, his vision was normal. During the course of another bombardment, he complained of an intense occipital headache, followed by instantaneous and complete blindness without convulsions.

When seen a couple days later, there were no ocular changes, V. R. = fingers 0.5, V. L. = fingers 1.5. History showed patient had been subject to frequent nervous crises, with loss of consciousness, but without epileptiform phenomena. No muscular paralysis. Upon removal from the zone of bombardment the vision gradually returned in both eyes. No therapeutic measures were employed. The period of cure was only one month, in contrast to the usual several months or years. The author does not suggest any explanation for the condition.

C. L.

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CHANGES IN REFRACTION WITH AGE

It still happens that a patient is told that if glasses are right he will never need to have them changed for far seeing. But this is so nearly opposite to the truth that most who are engaged in ophthalmic practice can disapprove it from their own experience. Astigmatism is generally supposed to change less than other forms of ametropia; yet statistics indicate (A. J. O. v. 2, page 22) that, taking all ages over an average period of less than nine years, two-thirds of them show change of astigmatism amounting to 0.25 D., or upward. The increase of hyperopia with age was mentioned by Donders; and the tendency of myopia to increase at certain times, in all cases; and thruout life in a few cases, is generally recognized.

What are these common changes in refraction? At what times of life are they most likely to occur, and what are the physical changes in the eye on which they depend? These are questions upon which it is of practical importance to

have definite ideas; and it ought to be possible to answer them out of the experience of the profession now accumulated.

With reference to astigmatism it is pretty well established that the kind called "astigmatism with the rule" is more common than the opposite kind, only in early life. All statistics bearing upon the subject show that after middle age it is the exception and becomes less and less common.

At birth practically all eyes are hyperopic. They are in transition, from a prenatal form in which they would be excessively hyperopic, toward a lower hyperopia or emmetropia. This process seems to go on more or less during early childhood. Accelerated by pathologic conditions arising from astigmatism and excessive near work, the tendency to lower hyperopia goes on to myopia which increases especially about puberty; and may continue to increase into adult life.

When full body growth is attained, there comes to the eyes a period of comparatively little change in refraction.

tion; tho to this rule there are many exceptions, mostly dependent on pathologic conditions, located within the eye or profoundly affecting the general nutrition. This period lasts roughly speaking from the age of 25 to that of 40 years. At this time of life, however, we are justified in telling the patient he may go several years without change of glasses, altho no immunity from change can be assured.

With the advent of presbyopia a decided tendency to change of refraction toward increased hyperopia appears. Donders recognized this, and ascribed it to latent hyperopia of earlier years becoming manifest. But we now have records of enough eyes, measured in earlier years under the most powerful cycloplegics, to know that in many cases the hyperopia is actually increased. The tendency of low and moderate myopia to decrease at this time of life is also encountered, altho it is far from being so marked or so general as myopes often hope.

After about 60 years of age there comes, in a continually increasing proportion of eyes, a tendency toward lower hyperopia, and actual and progressive myopia; the so-called second sight of old people that enables them to "read without glasses." This tendency is not manifest in all patients, but is so common among those of advanced years that we must recognize it as a general tendency of senile eyes; which balances ability to discard spectacles with loss of distant vision and actual lowering of visual acuity, and often ends in cataract.

The physical bases of each of these changes in refraction needs to be more thoroly worked out; but we already have a general idea as to what most of them are. The index of refraction of the cornea, aqueous, or vitreous, is sometimes mentioned as liable to change. But no change in the index of either of these has been observed that would be sufficient to account for the tendencies to general change of refraction referred to above. Their cause must lie in changes of size in the eyeball and lens, and changes in curvature

of the cornea and crystalline lens, or of index of refraction of the latter, or change in its position.

The change of dimensions of the eye by normal growth probably underlies the diminution of hyperopia in early childhood; and overgrowth of the eye, particularly of the sclera and vitreous, usually distinctly pathologic, is the basis of axial myopia. The known instances of the opposite change, shortening of the eyeball by flattening of the cornea, following inflammation or operation, are apart from those general tendencies we are now considering.

As pointed out by Priestley Smith, the continued increase in the size of the crystalline lens from infancy to old age must, if the lens keeps the same shape, result in an increased length of focus and tendency to increased hyperopia or diminished myopia. This seems to account for the tendency in that direction exhibited in adult life, and particularly between 40 and 60 years of age. The increase in the volume of the lens certainly occurs, is sufficient to account for this change, and is equally gradual.

The curvature of the anterior surface of the cornea has been widely observed, since the advent of the ophthalmometer in clinical work nearly 40 years ago. But most of the statistics published throw little light on the changes of curvature that occur with age. We need statistics that will indicate average curvature at different periods of life; and reports of the changes that have been observed thru measurements of the same eyes, repeated from time to time for many years. But what we already know is that in the larger proportion of cases there are no changes in the curves of the cornea that can account for the changes in the refraction of the eye. Very pronounced corneal changes follow injury or disease and cause great changes of refraction. But in the larger number of cases of refractive change there is no alteration in the cornea to account for it.

Of permanent changes in the curvature of the crystalline lens we know

very little. Observation of these curves has been confined to the laboratory, has never been resorted to clinically to any important extent; and the few eyes that have been measured in the laboratory have rarely been re-measured in after years. Reasoning about it by exclusion, we may conclude that important changes in total astigmatism without change in the cornea must be due to changes in the lens surfaces; but that is the only foundation we have for the assumption.

That changes in the lens associated with age do occur in all eyes, is well known in connection with presbyopia and "senile" cataract; and these include, beside growth of the lens, changes in its refraction and absorption of its cortex. In a few eyes the whole lens disintegrates and is removed. In a larger number the whole cortex liquifies. Probably in the majority of eyes that go to old age, there is some absorption of the lens cortex. In most cataracts that approach maturity the stage of swelling is followed by one of marked decrease in bulk. Sometimes the gray, or almost white cortex, disappears from the pupil, leaving the darker or brownish nucleus quite exposed.

Absorption of cortex appears to be the physical change producing senile myopia, the so-called "second sight." In the normal adult eye the refraction of the highly curved nucleus is partly neutralized by the convexo-concave layers of the cortex. As the latter are lost by absorption, the nuclear refraction predominates and rays entering thru the nucleus are focussed more in front of the retina. It is only necessary to suppose that such layers of the cortex shall be absorbed more in certain meridians than in others to conceive a sufficient cause for changes in astigmatism with age, even such great changes as those reported by Zimmermann. (A. J. O., vol. 2, p. 420).

Another possible cause for change in astigmatism is change in the position of the crystalline lens within the eye. That such changes may and do occur has been demonstrated experimentally,

in the falling of the lens toward one side or the other during extreme relaxation of the zonule during accommodation. A change of obliquity with such change of position would account for change in lenticular astigmatism.

A review of the possibilities for change in the ocular refraction shows how reasonable it is to expect such changes in the evolution and involution of the eye. Experience proves that they occur. The practical point is to be on the lookout for them, to be prepared to remeasure the eye for them and give relief by a new correction. Incidentally it is evidence of an understanding of the facts of the case to ascribe an inappropriateness of glasses worn by a patient, not to incompetence of a colleague who prescribed them, but to the changes that we now know occur, altho they were not recognized by some of the pioneer investigators of ocular refraction.

E. J.

NATIONAL MEETINGS

The American Medical Association will meet in New Orleans this year, on April 26, and its Section on Ophthalmology will hold its first session the morning of April 28. When the last meeting of the association was held in New Orleans, in May, 1904, the proceedings of this section were rather notable for their scientific interest. The program already arranged for the coming meeting is equally promising.

In the last 16 years there has been progress in the medical institutions of the city, commensurate with its commercial development following the opening of the Panama canal, and the quickened business activity of the South. Tulane University with its department of ophthalmology; and the Charitable Eye, Ear, and Throat Hospital and the Eye Department of Touro Infirmary are institutions that it is worth while to get acquainted with.

On Monday, April 26, comes the annual meeting of the American Board for Ophthalmic Examinations to pass upon candidates who have submitted

applications and case reports; and to examine those who appear at the meeting for its written, oral, and practical tests.

Probably this meeting will be the busiest it has ever held, one that will bring together a larger number of applicants than its earlier sessions, even in the large Eastern cities.

It should be remembered that the meetings of the Section of Ophthalmology of the American Medical Association are the largest annual gatherings of Ophthalmologists held anywhere in the world and the most democratic. Any member of the A. M. A. can join it by registering his desire to attend its sessions.

This year Victor Morax of Paris may be its guest of honor. It is peculiarly appropriate that in this old French city of the New World, such an opportunity should be given to American ophthalmologists to see and hear this leader in ophthalmology.

To know the personality of a scientific writer and clinician is to add to the value of all we read and hear of his work. The annual gathering of this scientific body is one of the great educational opportunities that is open to any of us. While it offers the advantage of all the members speaking the same language, the experience they have had is drawn from a wider part of the earth's surface than has been available for some of the international congresses of Europe. The importance of such opportunities should not be underestimated by those who can utilize them.

The meeting of the American Ophthalmological Society is a different occasion. This oldest of American special societies, and one of the oldest national associations of ophthalmology in the world—older than those of either Great Britain or France, has generally avoided large cities, except when drawn into the Triennial Congress of Physicians and Surgeons. This year it will meet at Hot Springs, Virginia, June 15 and 16.

For those who attend its meetings year after year, there is a peculiar

charm about them: and every member must attend once in three years to keep his place in the Society. There are no formal entertainments. But all are living in the same hotel, they get together in groups in the dining rooms, they hold evening sessions so that the afternoons can be spent on the golf links, or in walks or rides together; and the informal comparison of experience possible on these occasions is quite as valuable as that gathered by the printer and stenographer into the annual volume of transactions.

Altho the American Ophthalmological Society restricts its membership, and has a waiting list of candidates, it ought to be more generally known that ophthalmologists who are not members of the Society are always welcome at these meetings. Formally introduced to the Society, they are given the privileges of the floor, and participate in its discussions. This opportunity for mutual acquaintance allows the Society to judge as to who of the younger men are likely to add most to the interest and value of its scientific proceedings, the high standard of which is a proper object for pride on the part of its members.

New discoveries may not be brought forward at either of these meetings to make them especially memorable in the long series of such annual gatherings; but no one who attends them with intelligent interest can fail to become wiser in ophthalmic science, and safer and more successful in the practice of his part of the healing art.

E. J.

PUBLICATION RESUMED

The Journal of OPHTHALMOLOGY, OTOTOLOGY AND LARYNGOLOGY, which for twenty-three years held a recognized place among the special journals of this country, suspended publication about two years ago. It now reappears, beginning volume 24 with the January number, in its old neat and attractive form. It is the official organ of the American Homeopathic Ophthalmological, Otological and Laryngological

Society; and this number is occupied chiefly by the President's Address, proceedings and papers read before the last meeting of that society, held at Asbury Park in June of last year. We welcome its former editor, Dr. G. W. Mackenzie, and his present associate, Dr. Douglas MacFarlan to their editorial labors.

H. A. FOX

Miss Harriott A. Fox, who for more than twelve years acted as publisher of the *Ophthalmic Record*, and since its foundation by merger has filled a similar position on the staff of the new *AMERICAN JOURNAL OF OPHTHALMOLOGY*, has resigned her office, to take effect the first of March. She relinquishes the post she has filled so faithfully, and so acceptably to the staff of both periodicals, with the best wishes of the Editors of this *JOURNAL*, for a happy future. We understand that Miss Fox, after spending several months in the East, will open an artist's studio in Chicago, and follow a profession for which she is eminently fitted.

BOOK NOTICES

The Nose. Paranasal Sinuses, Nasolacrimal Passageways, and Olfactory Organ in Man, by J. Parsons Schaeffer, A.M., M.D., Ph.D. With 204 illustrations of which 18 are printed in color. Philadelphia, P. Blakiston's Son & Co. Price \$10.

This monograph, a quarto of 370 pages, is an exhaustive treatise upon the embryology, anatomy and physiology of the nose and sinuses, a modern type of essay and a valuable contribution to anatomic study, based largely upon anatomic material studied over a period of years.

We look upon the eye as a most complex organ. The nose, even to the rhinologist, is not seemingly so complicated. But when we consider the extensions of the nasal passages into the cranial bones which form the sinuses, the two-fold offices of the organ, for breathing and for smelling, and its

ancillary structures—as the lacrimal canals; and if we remember that in the development of the human cranium and the face the nasal chambers have been distorted from the mammalian scheme, and that the olfactory organ is but rudimentary in man, compared to his forbears, we will at once recognize its complexity. Again there is no unvarying typical or ideal anatomic type, and we are most profoundly impressed with the ever recurring departure in morphology from the conventional or typical description.

* Study of the embryology and development of the nose shows it to be a wonderful organ of morphologic intricacy, but the descriptions here given are the fullest and best that the reviewer knows of in the English language. The accessory sinuses are fully dealt with. Of particular interest to the oculist is the chapter on the nasolacrimal passageways, and new light will be gained by its perusal. In contradistinction to the usual book description, and to the general conception of the lacrimal canals, the many preparations made by the author show that it is seldom a tube. It is not often found even partially straight, but in the average case it is tortuous with diverticula which in some instances absolutely preclude the passage of a sound without penetrating outside of its lumen; and hence the fallacy and impossibility of treating a case of lacrimal obstruction in some patients by using probes.

The view of the anatomy to be gained by perusal of this chapter will be of great aid to the surgeon, not only for the external but also for the intranasal operations. The olfactory apparatus proper—the anatomy and physiology of the sense of smell is fully given—the work being mostly original, few quotations from the literature will be found. It is well printed, bound, and replete with good illustrations.

H. V. W.

There was a period in the specialization of practice, when the eye and ear furnished the field cultivated by one

group of specialists while another group confined their studies and services to the throat and chest. The nose was scarcely considered as having diseases or deformities that were of practical importance, outside of those then treated by the general surgeon. Gradually this has been changed, and in the group of head specialists, the nose and its pathologic conditions stand at the center, connecting with all these fields of special practice. Whether the specialist seeks to confine his work to the eye, the ear, or the throat, he must make himself more or less familiar with the pathology of the nose; if he is to be thoroly prepared to deal with diseases of the part to which he has restricted his practice.

Then in rhinology, anatomy plays a proportionately more important practical part than in any other field of special practice. This gives to this work by the professor of anatomy at Jefferson Medical College its great interest for the ophthalmologist. The eye embedded in the orbit, which is largely surrounded by the nasal accessory sinuses, is in various ways likely to be affected by nasal disease; and at every point the dealing with these ocular complications rests directly on our knowledge of the anatomy of the parts surrounding the orbit.

Three of the relations of ocular to nasal disease are especially prominent today; the pathology of the nasolacrimal passages, the relations of ethmoid and sphenoid to optic nerve disease, and focal infections; while an important share of serious orbital disease comes clearly by extension from the nasal accessory sinuses.

This book is divided into chapters as follows: I, Embryology and Development. II, The Definitive Nose. III, Maxillary Sinus. IV, Frontal Sinus. V, Sphenoidal Sinus. VI, The Ethmoidal Cells. VII, Nasolacrimal Passageways. VIII, Nasal Mucous Membrane. IX, Blood and Lymph Vascular System. X, Nerves of Nose and Paranasal Sinuses. XI, The Olfactory Apparatus Proper. XII, Physiological Agenda. The index of 12 pages is exceptionally complete.

A very large part of the value of this book lies in its clear, well chosen, accurately drawn and beautifully reproduced illustrations. To these the busy practitioner can turn to refresh his memory, and fix his mental picture of all the parts that enter or adjoin his field of operation. Those who get the work will use it and be glad they have it.
E. J.

Transactions of the Pacific Coast Ophthalmological Society. The seventh Annual Meeting. San Francisco, Aug. 4-5-6, 1919, 8vo., pp. 64.

This society with more than two hundred members publishes transactions that would do credit to older and more widely known organizations. Two-thirds of the papers here published relate to Ophthalmology, and most of them are to be found in the pages of this Journal. These papers, however, gave rise to spirited and interesting discussions which are included in the "Transactions;" and we note that two of the six sessions of the meeting were devoted to clinics.

These transactions would be more useful as a work of reference if furnished with an index and table of contents; and if printed in type of reasonably large size, and in the style adopted by other societies would make a volume of more than double the number of pages.

The illustrations consist of three plates and eight charts of fields of vision, all well printed. We would suggest to ophthalmologists from other regions that this society is well worth attending.

E. J.

Ophthalmic Section, Department of Public Health, Egypt. Fifth Annual Report, by the Director of Ophthalmic Hospitals. Quarto 32 pages. Cairo Government Press.

This report by Dr. A. F. MacCallan represents the work in 1917 of 13 permanent and 4 travelling hospitals, which dealt in that year with 81,529 new patients, the total of attendance being 1,004,161; and the operations performed 59,581.

It is interesting to know that the study of ophthalmias in Egypt is being carried on upon a gigantic scale. We

have here a tabulated report of 12,642 cases of acute conjunctivitis. The diagnosis has been based on examination of the discharge under the oil immersion lens of the microscope, showing the principal causes to be in the order of frequency, the gonococcus, the Koch-Weeks bacillus and the Morax-Axenfeld bacillus. The seasonal relation of the first two are shown by tracings as compared with those of mean daily temperature. Then there are interesting tables showing the frequency and causes of blindness, incidence of primary glaucoma, causes of optic atrophy, work done at all the hospitals, list of diseases, and number of cases of each, a pathologic report on 176 specimens, etc. It is encouraging to learn that the Director with the assistance of the Inspectors gave a complete course of postgraduate lectures on ophthalmology, with pathologic and bacteriologic demonstrations and laboratory work. E. J.

Winifred Hathaway, Manual for Conservation of Vision Classes. National Committee for the Prevention of Blindness, New York City. 108 pages, illustrated.

One of the advanced factors in the moulding of public opinion, and from it the enactment and enforcement of wise rules is the National Committee for the Prevention of Blindness. Its publications are all written in a popular style, for the benefit not only of physicians and nurses, but for parents and the general public as well. We largely have this society and its professional members to thank for the publicity which has reduced the cases of ophthalmia to a minimum; and which by its efforts has secured the enforcement of protective devices for the prevention of eye accidents in America.

Here we have a new idea, the segregation of the child with poor sight in special classes at the public school, with special teachers, special equipment and books with large type and lessons which do not strain the eyes. These have been most successful in the states of Ohio, New York and Massa-

chusetts, and progressive states with large cities will surely now take up the work.

Cooperation between the physicians, the teacher and the parents is obtained; and the child in many cases so benefited that after some months he is enabled to go into the general classes. It is stated that the best recommendation for conservation of vision classes comes from the pupil himself who may have been a dull, backward child, but who soon learns and likes his studies in most cases, keeping well up with those who are favored with strong eyes.

The pamphlet is freely and finely illustrated and is a model of proper printing.

H. V. W.

Ernest S. Bishop, M. D. The Narcotic Drug Problem; 165 pages. New York, the Macmillan Company.

Perhaps the ophthalmologist per se is not directly interested in the drug habit—for his patients seldom acquire the predilection from eye disease which calls for drugs to which an addiction may be created. But as many in America are really head surgeons, treating as they mostly do the nose, throat and ear, they have had more or less experience with dope-eaters. Indeed the cloture on the indiscriminate sale of narcotics has necessitated the careful putting away of the office narcotics as well as cocain, for if left in sight, these bottles may mysteriously disappear by theft.

The author treats the subject, as well as his patients, from the standpoint of disease. We are led to understand that there is always a pathologic reason for the beginning of the habit, a necessity for surcease from pain, for relief of a neurosis or a background of disease. Thus, for a cure, the cause must be ascertained and physiologic remedial treatment instituted.

Until the drug idea is eliminated from the doctor's mind and the concept of the disease is understood, the medical man cannot scientifically and satisfactorily cure the case.

This little book is interesting and well written. H. V. W.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon. Volunteers are needed in other localities.

DEATHS.

Dr. Michael Behrman, Visalia, Kentucky., aged thirty-eight, is believed to have died from a self-inflicted wound in the head.

Dr. Frederick James Bowles, New York City, aged sixty-seven, a member of the American Academy of Ophthalmology and Oto-Laryngology, ophthalmologist to the Bloomingdale Clinic, died in the Post-Graduate hospital, January 28th, from pneumonia.

Dr. James Jefferson Johnson, Captain, R. C., Braggs, Okla., aged 43, died in Siberia December 13th, from typhoid.

Dr. James M. Shorter, Macon, Ga., aged sixty-nine, oculist to the Macon Hospital and to the Southern Railroad; a member of the American Academy of Ophthalmology and Oto-Laryngology, died February 2d.

PERSONALS.

Dr. L. Webster Fox of Philadelphia has returned from a trip to Florida.

Dr. Vard H. Hulen has moved his office and residence from San Francisco to Berkeley, Calif.

Dr. Howard F. Hansell of Philadelphia spent the last week of February at the Hotel Chamberlain, Old Point Comfort, Va.

Dr. S. Lewis Zeigler of Philadelphia, we are glad to announce, has recovered from a severe attack of bronchitis, which has confined him to the house for the past three weeks.

Dr. A. Cantonnet of Paris is the ophthalmic editor of the New "La Medicine," to be published monthly, the first number of which has just appeared in Paris. Occasional numbers are to be devoted to ophthalmology.

Dr. Frederick T. Clark, having been honorably discharged from the United States Army, has resumed the practice of ophthalmology and oto-rhino-laryngology with offices at 80 Elm street, Parks building, Westfield, Mass.

Sir William T. Lister, K. C. M. G., has been appointed surgeon to the Royal London Ophthalmic Hospital. T. W. Letchworth has been appointed assistant surgeon to the Royal Eye Hospital. A. E. Reynolds has been appointed assistant ophthalmic surgeon to the Miller General Hospital, Greenwich. A. C. Roper has been appointed

honorary consulting surgeon and honorary governor to the West of England Eye Infirmary, Exeter, and G. P. Hawkins has been appointed to the same institution. H. W. Archer-Hall has been appointed assistant surgeon to the Birmingham and Midland Eye Hospital. (British Journal Ophthalmology.)

SOCIETIES.

Dr. Frederick C. Lewitt has been elected chairman of the Eye, Ear, Nose and Throat Section of the San Francisco County Medical Society for the present year.

At a meeting of the Milwaukee Oto-Ophthalmology Society, on February 6, 1920, Dr. Gustavus I. Hogue was elected president of the society.

The Sioux City Eye and Ear Academy recently elected officers for the coming year. President, James E. Reeder, Sioux City; vice-president, Frank I. Putman, Sioux Falls, and secretary-treasurer, Lorenzo N. Grosvenor, Huron, S. D.

Owing to the epidemic of influenza, the joint meeting of the Minneapolis Academy of Ophthalmology and Oto-Laryngology, the Milwaukee Oto-Laryngological Club, the Chicago Oto-Laryngological Society and the Chicago Ophthalmological Society planned for February was indefinitely postponed.

The New York Association of the Blind has issued a statement saying that one of the fundamental purposes of the organization is to help newly blinded men and women adapt themselves to the changed conditions that blindness imposes.

The Ophthalmic Section of the College of Physicians of Philadelphia has elected the following officers for the year 1920: Chairman, Dr. G. Oram Ring; secretary, Dr. Milton C. Griscom; executive committee, Drs. Samuel D. Risley, Howard F. Hansell and William T. Shoemaker.

Dr. George E. de Schweinitz of Philadelphia acted as toastmaster at the dinner of the Society of the Alumni of the University of Pennsylvania, which was held at the Bellevue-Stratford Hotel on Saturday evening, February 21st. The principal addresses were made by General Atterbury, vice-president of the Pennsylvania Railroad, who was in charge of the transportation of the A. E. F. in France, and by the provost,

Edgar Fahs Smith, who, to the great regret of the Alumni, is about to retire from the position he has so conspicuously adorned.

At the February meeting of the Chicago Ophthalmological Society the following papers were read: "Ocular Manifestations in Encephalitis Lethargica," by Dr. Sidney Walker; "An Anatomical Study of Six Cases of Degeneration of the Cornea," by Dr. Charles A. Maghy; "The Economic Phase of Ophthalmology," by Dr. Austin A. Hayden.

The next annual congress of the Ophthalmological Society of the United Kingdom will be held on Thursday, Friday and Saturday, 29th and 30th of April and 1st of May, 1920. President, J. B. Story. Thursday, April 29th: Morning at the Royal Society of Medicine, 1 Wimpole street, W. L. President's opening address, papers. Afternoon: At the Royal London Ophthalmic Hospital, City Road, E. C., L. Clinical meeting, exhibition of books, museum specimens, drawings and portraits belonging to the hospital. Members will dine together in the evening. Friday, April 30, at the Royal Society of Medicine, at 10 a. m. "Discussion on Diabetes in Relation to Diseases of the Eye," to be opened by Sir Archibald Garrod, Mr. R. Foster Moore, and Dr. E. Spriggs, and the following: Dr. Leyton, Mr. G. Mackey, Dr. Poynton, Mr. P. H. Adams, Dr. Cammidge, Mr. Gray Clegg and Dr. A. Renshaw. 5:30 p. m., business meeting; 8:30 p. m., papers. Saturday, May 1st, at 10 a. m. Visit to St. Margaret's Hospital, Leighton Road, N. W. 5, the special hospital of the Metropolitan Asylums Board for cases of ophthalmia neonatorum. Discussion on "The Prevention and Treatment of Ophthalmia Neonatorum," to be opened by Dr. Gibbon Fitzgibbon, master of the Rotunda Hospital, and Mr. M. S. Mayou. The following also will speak: Mrs. Scharlieb, Dr. Macrory, Messrs. Sydney Stephenson, Maitland Ramsay and J. Wharton.

R. R. James and F. A. Juler, Hon. Secs.

MISCELLANEOUS.

By the will of the late Mrs. Eliza Avius of Birmingham one thousand pounds were bequeathed to the Birmingham Eye Hospital.

The *Anales de la Soc. Mexicano de Oftalmologia* with its second volume has enlarged its pages to include oto-laryngology.

The Norwegian Societe des Sciences, of Christiania, has awarded the Fridtjof Nansen prize to H. Shiötz and S. Holth for their remarkable work on glaucoma.

Henry S. Pritchett, president of the Carnegie Foundation for the Advancement of Teaching, pays a very beautiful tribute to Christian R. Holmes in a letter to the editor of the *Journal of the American Medical Association* in the issue of February 7th. It is well worth reading.

Starting in 1915 with sixty-five charter members, the National Committee for the

Prevention of Blindness now has enrolled nearly twenty-three hundred members in forty-seven states, in Cuba, the Philippines, Porto Rico, Mexico, China and Canada. It has pushed laws for the prevention of blindness and had them passed in eighteen states.

A most imposing ceremony and historical pageant ushered in the inaugural exercises of the University of Strasbourg under French rule on November 21st. The president of the republic and three marshals of France took part in the festivities, also delegates from many universities in France and abroad. Dr. Duverger is professor of Ophthalmology in the university.

In the will of the late Christian R. Holmes of Cincinnati he sets aside a fund of \$25,000 to provide for the establishment of a journal for the medical department of the University of Cincinnati.

The friends of Christian R. Holmes have planned to raise a fund of \$1,000,000 for medical research, the endowment to be known as the Christian R. Holmes Medical Research Fund. The Carnegie Corporation has made a gift of \$250,000 to the Medical College of the University of Cincinnati as a tribute to Dr. Holmes' services to humanity and to endow a chair in his memory.

The Medical Summary, commenting on a request for a good glaucoma treatment, shows its appreciation of the situation in the following: "If any of the brothers happen to be in possession of a medical cure of cancer, an unfailing specific against pneumonia, and a certain preventive against death, will they not also publish these? We must get together, brothers, and help each other out."

The general assembly of Ohio recently provided funds for a campaign against trachoma. The work will be done in cooperation with the United States Public Health Service and local health authorities. The entire state will not be canvassed at one time, but intensive campaigns will be conducted in individual counties. Clinics will be established, school children will be examined and treated. Educational measures will be carried out.

The thirty-eighth annual business meeting of the Pennsylvania Home Teaching Society and Free Circulating Library for the Blind, elected the following for the ensuing year: Dr. L. Webster Fox, president; John E. Baird, vice-president; Ellis A. Gimbel, vice-president; John J. Wilkinson, treasurer, and Mrs. Isabel W. Kennedy, secretary.

According to the report of the secretary, during the past year the seven home teachers, all but one of whom are blind or partially blind, paid 5,936 visits to the blind in the following counties: Philadelphia, Clinton, Center, Erie, Crawford, Lawrence, Beaver, Allegheny, Washington and Indiana; 26,928 volumes, in six different type, were circulated during the same period, and free writing, knitting, typewriting, crocheting and sewing were given.

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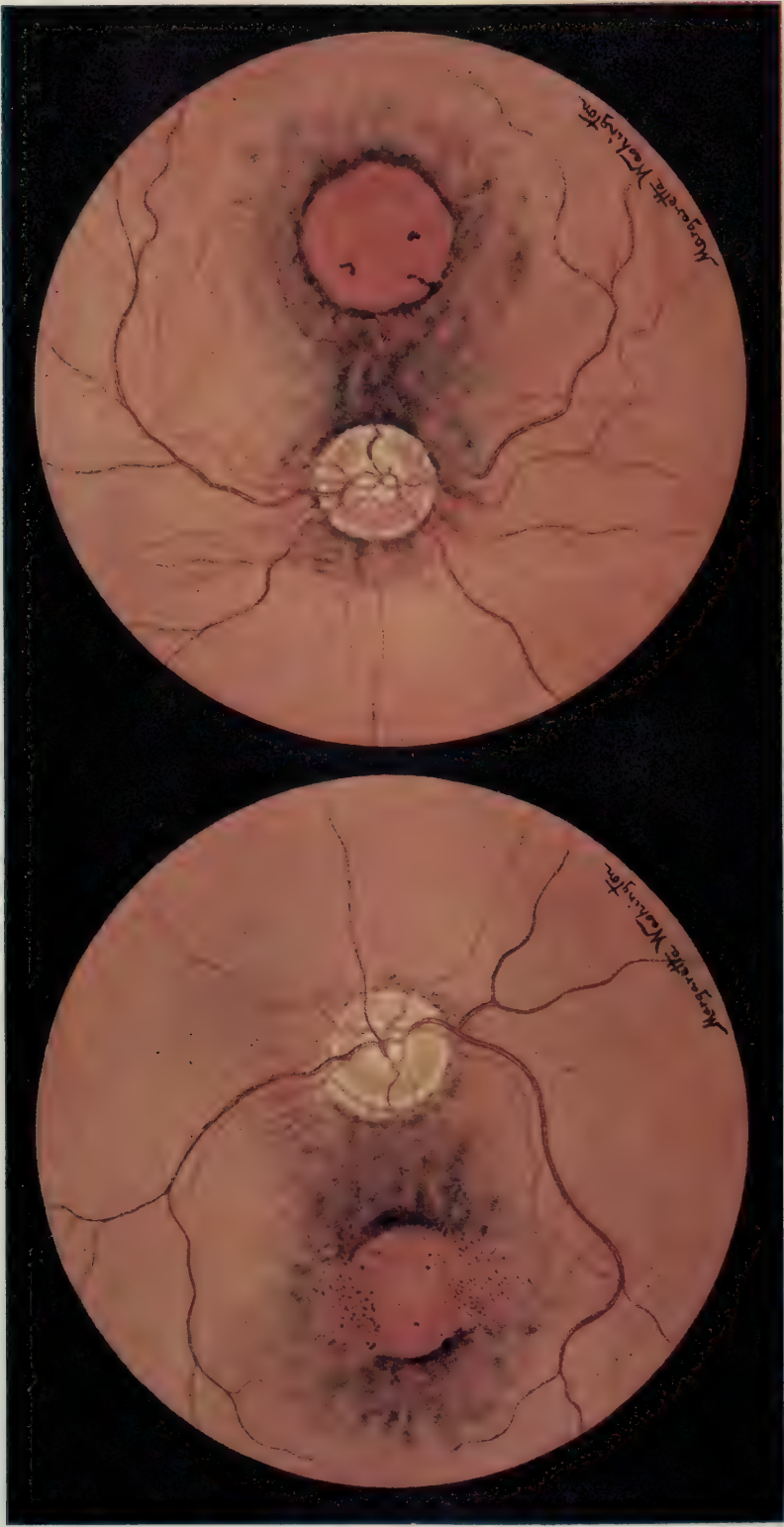
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LEFT EYE

SYMMETRICAL MACULAR DEGENERATION. (CHANCE)

RIGHT EYE

SYMMETRIC MACULAR DEGENERATION IN A BROTHER AND SISTER.

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The degenerative changes revealed by ophthalmoscopy in these patients are accompanied by low visual acuity, defective color vision and some contraction of the visual fields. The eyes also presented rather high astigmatism. A maternal aunt presented a different anomaly of the central retina. Reported at the Meeting of the Section on Ophthalmology, College of Physicians, January 15, 1920. With two water color drawings.

In order that they might be included among the already reported cases of symmetric disease of the macula, found in two or more members of a family, I desire to give a brief account of the findings occurring in the case of a man and his younger sister.

Harry D., aged 28. Ophthalmoscopic examinations:

Right: Clear Media. Disc nearly circular, the edge of which is well preserved, but the pigment line along the temporal border is broken and slightly absorbed. The surface of the disc shows few, if any, capillaries, and the arteries and veins might be considered too narrow for one of his years and physique. Thruout the fundus the retinal epithelium is slightly absorbed, and the membrane "peppered"; and that portion of the fundus embraced by the temporal vessels is quite black with pigment.

The macular region presents a well marked disk-shaped area of distinct absorption of the retinal tissue. It is bordered by fine soft pigment which is heaped up on the inner and the outer borders; while at the upper and the lower, the pigment is scattered, and, at these portions the choroid beneath shines thru like flames. The chorio-capillaris is exposed, and across the lower chord runs a branch of the mid-temporal artery. The upper portion of the rim seems to have fine fibrils stretched across it. There are no signs of active inflammation within the area,

and there are no outlying areas of disease. The dimension of the area is greater than that of the optic disc, the upper edge of the spot being on a line with the upper edge of the nerve head.

Left: Thru the unobstructed media the fundus is seen to possess practically the same features as those given in the description of the right eye. The disc is sharply outlined by its preserved borders. The central vessels show a greater branching, and the individual trunks are somewhat narrower in caliber than was noted for the right eye. The region embraced by the temporal vessels is dark, yet it is not so densely pigmented as that in the right.

The macular region is occupied by the same sort of anomaly as that present in the right eye. This area is larger than the optic disc. Its border is quite complete and is slightly elevated above the retinal level. The choroid is shown as a rough surface with here and there capillary loops shining thru it. In general, the choroïdal level is deeper than is the level in the spot in the right; so that the formation here is somewhat crater like. No vessels extend across, but a branch of a vein skirts the lower edge, and there are three clumps of pigment on the surface, one of which is connected with the rim. As in the right, the rest of the fundus is healthy. I fancy that the degenerative changes of this eye are of a later date in their origin than are those of the right.

Agnès D., aged 24. Ophthalmoscopic examinations.

Right: Beneath the lens capsule, at the temporal side of the anterior pole, is a small dot like opacity. The disc is vertically oval and is without a physiologic cup. The upper border is veiled by opaque fibers; and on the temporal side, beyond a pronounced pigment line, is a distinct conus, to the outer side of which is a dark streak of pigment. The main vessels are much narrower than what one usually finds in persons of this woman's age. The papillomacular region is darkly pigmented.

The macular region itself is occupied by an irregularly round atrophic area, without elevated border, the surface seeming to be depressed below the level of the retina as tho the tissues had become absorbed. Stretching across the area from the upper temporal quadrant to the lower is a reddish streak, which is touched at its middle by a blackish streak from the upper nasal quadrant. The long diameter of the area is about one-half the width of the nerve head. In general the characteristics are like those of the areas in the brother's eyes. The area has not such an appearance as tho it had been produced by recent inflammation, neither are there any signs of inflammation nor of atrophy elsewhere in the fundus. The eye is myopic 3 D.

Left: In the lower nasal quadrant of the cornea is a maculation, which followed a remembered attack of inflammation; and, as in the right, there is an opacity in the lens. The disc is vertically oval with a narrow cup in the center, out of which extend the vessels which are of about the width of those of the right, and the courses of the superior vessels are outlined by opaque fibers. The temporal border of the disc is paralleled by an ill defined conus. The nasal fundus is quite granular and the papillomacular region is darkly colored by scattered pigment, while the macula itself is blotted out by an area of nearly the same size, but not quite so deep as the depth appears to be in the spot of the right eye. The eye is myopic 3 D.

The man came to Wills Hospital in May, 1916. Thru the great kindness of Dr. Schwenk—I was then his assistant—I was allowed to study his case. The young woman was brought to me later, privately. Examinations were made repeatedly in that year; before the time set for a review arrived, I was on active duty in the army. The man was examined again only recently.

The sketches, made by Miss Washington, after repeated sittings, are remarkably true in details and colors. For some reason or other, she asked me to excuse her from sketching the woman's eye grounds, but offered, instead, the view that, to her eye, the characteristics of the woman's case might satisfactorily be indicated by the sketches of the man's taken together with my descriptions written at the time of the examinations.

The subjects are the children of Irish-American parents who were not consanguineous. They are the fourth and fifth children in a family of seven, five boys and two girls. The eldest, a brother, has one poor eye; his symptoms are not like those of H. and A. One of the brothers is dead: his death was not unusual, but the exact details were not obtained.

H. and his sister had had fair school education which they pursued up to about fourteen years of age. They had no unusual disease altho H. had pneumonia in his early years. From about their tenth or twelfth years each had defective sight. In 1903, Agnes consulted Dr. Fisher, at Wills Hospital, when she was ordered minus cylinders of 3 D. The notes state: "V. both eyes 5/35. pulsing veins; Vessels slightly attenuated. Spots at maculas."

The man has a slight dread of light, or rather, he is a bit dazed and peers about as tho somewhat dayblind. He has a convergent squint of the first degree, without nystagmus. But the young woman has a distinct horizontal nystagmus when she forcibly directs her attention. She is not dayblind.

Each has defective color vision of which each is aware. The woman wore a pink and white striped dress, the stripes one inch wide. To match the

pink she selected a blue skein. Green skeins she called "white"; for which she selected grays and blues. The rose skein she called "pink," and selected one blue and two reds. The man mis-called green, "pink," and selected a drab, one green, two roses, and a blue. A cobalt light appeared to him to be composed of red and light green. To him the rainbow had never been otherwise than as a whitish path in the sky.

The fields of vision were equally interesting. That for the man's right eye showed a regular contraction: N. 40; S. 40; T. 60; I. 40; for white, but when colors were used on the carrier, he could not name the colors altho he could distinguish the spots. The maps of such fields showed in comparison with white concentric contractions; without crossings. In the upper nasal quadrant from diameters 25° to 45° , was a well marked oval scotoma, 20° to 40° . The left chart showed practically the same amplitude without scotomata. He called 20 mm. green, "blue."

The woman's chart registered the following:

Right: Using white, 10 mm. square, marked regular contraction: N. 35; S. 35; T. 40; I. 35; without cuts or scotomata. Marked color defects were manifested: red and green were perceived but only as being different from white; yellow as "white"; blue uncertainly as "blue," green as "blue" and red undifferentiated from the black of the carrier.

A study of their refractions show that the man's visual acuteness equalled, in the right, $2/60$, corrected by $+2.50$ S. $\odot +2.00$ c. ax. $180^{\circ}=5/50$. L= $2/60$, with $+2.50$ S. $\odot +2.00$ c. ax. $15^{\circ}=5/50$; but later, when using his spectacles with both eyes open he was able to read $5/25$, and type 0.75.

The woman's record was as follows: each eye $5/50$, R— 3.00 c. ax. $180^{\circ}=5/50$. L.— 1.00 S. $\odot -1.87$ c. ax. $180^{\circ}=5/50$, with both eyes open, $5/35$. The brightness of her sight was greatly increased by pin holes.

I regret that I have not yet had an opportunity to examine other members

of this family, yet, I had the chance to use the ophthalmoscope on a maternal aunt, of perfect health, with "strong eyes" which had never been diseased. She presented in her right eye an interesting fundus picture. In the region between the disc and the macula appeared a bright glistening area, map-like, or a two-peaked iceberg, on a level with the lower third of the disc, above which was another irregular area of almost the same general length; but extending beyond the outer border of the lower, and, midway between these two areas, a small island over the outer "peak." These curious anomalies were in the retina. There were no signs of disease or other anomaly. The left eye was healthy in all respects.

These cases undoubtedly are manifestations of degeneration of the retina, the cause of which I cannot explain. I do not believe they are congenital in origin, but became manifest in late childhood; and are, I fear, slowly progressive; altho there were no distinct departures from the depictions in the sketches when the man was examined late in October, 1919. I believe syphilis and tuberculosis can be excluded. Except for the symmetric areas the funduses are comparatively of such healthy appearance that one would not suspect so great a disease in the macular regions. Just why a pathologic agent should have selected the macular region for its action is inexplicable. I do not regard as valueless, in the complexity and the mystery of the case, the presence of the increased pigmentation of the retina; but believe that it is significant of a diffuse retinal degeneration.

I have not read every report of cases exhibiting bilateral macular degeneration; but from such research as I have made I regard my cases as unique in respect to the sizes of the degenerated areas, their sharp delimitation, their color and the comparative freedom from pigmentation on their surfaces, as well as the similarity of the characteristics of the two cases.

RADIUM IN THE TREATMENT OF DISEASES OF THE EYE AND ADNEXA.

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This paper is based upon cases treated in the sections on Laryngology, Oral and Plastic Surgery and Ophthalmology in the Mayo Clinic. It includes a discussion of conditions likely to be benefited by radium with reports of illustrative cases.

The use of radium in the treatment of diseases of the eye and adnexa is becoming more common with the greater availability of the element. Radium has been employed in corneal ulcer, and in inflammatory diseases of the lids and globe, but has been found to be most useful in the treatment of malignant diseases and vascular tumors. Lawson, Ryerson, Williams, and others have reported cases which clearly demonstrate the value of radium in such conditions while Cohen has found it of some use in retarding the development of certain types of cataract.

Vernal catarrh is probably benefited by radium treatment; Pusey and Butler have reported cases in which the treatment was very satisfactory. We have treated 9 cases of vernal catarrh, but are withholding the report of results until we have made a further study of the cases.

It has been recommended that glioma and melanosarcoma shall be treated with radium (Heckel). Its use in glioma, however, is believed to be unwarranted by Horsley and Finzi; who say, "Radium rays from which the less penetrating beta rays have been filtered off . . . exert no influence, discoverable by present methods, in the nerve tissues." The radium has no effect on melanotic tumors comparable with its effect on basal-cell epitheliomas or vascular tumors and should be used only after wide removal of the pigmented mass.

Our own experience with the use of radium in diseases of the eye has been in two groups of cases, first those cases which in our judgment should be treated with radium alone; and second those in which the radium treatment is employed in addition to surgery. The malignant cases are selected on a

basis of the character of growth, chronicity, and extent of involvement of the tissues. Various types of epithelioma may be found about the lids and globe as well as within the eye. They may be situated on the margins of the lid, at the canthus, or at the limbus. The degree of malignancy will be determined by the type of cell most abundant, and by the location and direction in which the tumor extends. A basal-cell epithelioma may extend over considerable area on the surface of the lids and do less permanent damage than a much smaller, similar epithelioma at the inner canthus, which is rapidly extending toward the apex of the orbit.

Epitheliomatous nests that lie deep in the tissues are difficult to reach, and for several months, or even years, after treatment with radium, it is often impossible to determine whether or not the growth has become inactive. A section of tissues which had been subjected to treatment with radium years before, for epithelioma, was found to be undergoing epithelial cell proliferation and infiltration, without evidence on the surface. In some cases, therefore, it is better to remove the involved tissue with the knife or cautery and apply radium later. In other cases radium alone may be sufficient to effect a cure.

The action of radium in infectious diseases of the eye is comparatively slow. Rapidly extending ulcers of the cornea should be treated locally by the remedies commonly employed in addition to the use of radium, if it is used.

APPLICATION OF RADIUM.

In diseases of the eye and adnexa radium is applied directly in contact with the growth in the form of a plaque, or as emanations.

In treating tumors it is best to insert the emanation or the radium directly into the center of the tumor. In treating superficial lesions the use of the plaque or the radium tube directly against the skin is the preferable method. We have not used any screening in these cases, except the rubber finger cot that encloses the radium tube or plaque. It is desirable that the cornea shall be protected in treating lesions of the lid in order to prevent severe reaction, but we have not seen any serious effects on the cornea from the use of radium. For this we have used a screen of lead 2 mm. thick.

In treating lesions of the cornea the eye is cocainized, a self-retaining retractor inserted, the radium placed in a lead applicator, and an area of the radium is exposed the size of the lesion to be treated. A nurse holds the applicator in position directly in contact with the lesion for as long as it can be borne comfortably by the patient, usually from fifteen minutes to one-half hour. It is essential in treating lesions around the eye that all radium applications shall be given within ten days so that the treatment will be completed before the radium reaction begins from ten days to two weeks afterward, lasting from two weeks to one month. The patient is advised to leave the area during this time open to the air as much as possible and to cleanse it with boracic solutions.

TYPES OF CASES TREATED.

Cases	133
Angioma of the lids.....	10
Blastomycosis of the lids.....	3
Vernal catarrh	9
Basal-cell epithelioma of lids and canthus	97
Epithelioma of the limbus.....	2
Sarcoma of the orbit.....	12

ANGIOMA OF THE LIDS.

Radium is specific for angioma, lymphangioma, and hemangioma. The best results are obtained in young children, and in this group the angioma may be removed with but little if any deformity.⁶ In treating the cavernous

type, the radium is used in the form of a very small tube which is inserted into the center of the tumor, thru a small incision in the normal skin close to it. A small pointed forceps is used to burrow into the tumor, in the same manner that a blister is opened. The radium tube, attached to a silk thread, is inserted thru this channel and left in place several hours, depending on the number of milligrams used and the size of the tumor. The results in this group of cases have been especially satisfactory; most of the tumors disappear in three or four months with one treatment. Superficial angiomas are treated by means of a 5 mg. plaque, kept moving over the entire area, thus distributing the treatment evenly.

BLASTOMYCOSIS.

Blastomycosis is treated by holding the radium tube or plaque directly over the lesion. The tissues about the lesion should be screened with lead 2 mm. thick, in order to protect them from the rays. The patient should be seen about every six weeks, so that if the first treatment is not sufficient to clear up the lesion it may be treated before the condition has a chance to become more extensive.

BASAL-CELL EPITHELIOMA.

Basal-cell epithelioma of the lids without involvement of the tarsus or bone may be entirely removed by radium treatment. The type of epithelioma and its location should be carefully considered before radium is recommended for lesions around the eyes. If the lesion appears to be active and extending rapidly, in all probability it is squamous-cell epithelioma which has developed on basal-cell epithelioma, and does not respond to radium so well as the basal-cell type, and therefore should be removed by excision with the knife, or knife and cautery, and the open wound treated with radium. If the bone is involved and there is a reasonable chance of eradicating the trouble the growth, and the eye if necessary, should be removed, the bone thoroly cauterized with soldering irons, and radium used in the open wound.

Temporizing in the treatment of epithelioma, especially epithelioma around the inner canthus, is frequently the cause of failure to cure. Radium eradicates the growth in a very large percentage of cases of basal-cell epith-

eral anesthesia should be employed and the excision made very wide of the growth. If a local anesthesia is used there is always a possibility of traumatizing some of the cells of the tumor. A plastic operation should not be done

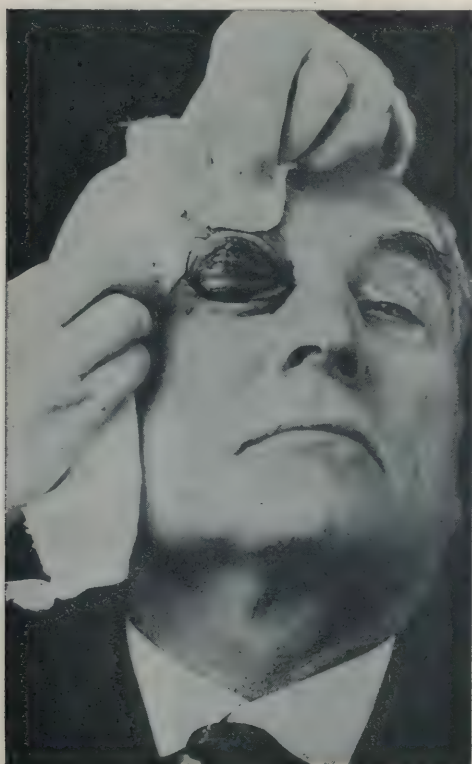


Fig. 1. Sarcoma of Orbit, Feb. 25, 1918, before treatment with radium.



Fig. 2. Same as Fig. 1, April 17, 1918, after treatment.

elioma involving the lids, but not the tarsus or bone. The patient should return for observation about every six weeks for several months, so that if the trouble is not entirely eradicated by the first treatment, further treatment may be given. However, a large dose of the radium should be given at the first treatment since frequently the lesion treated with small doses is only aggravated, and the possibility of clearing up the trouble is diminished.

Melanotic tumor should not be treated with radium, but a radical operation to remove the growth should be done, since this is the only means of eradicating the malignancy. A gen-

on the lids for at least six months after the removal of the growth, because it tends to cover up the area in which the recurrence may take place.

SARCOMA OF THE ORBIT.

Sarcoma of the orbit is best treated by inserting the radium in the form of a tube directly into the tumor. It is well also to ray the parotid and submaxillary glands as a prophylactic measure. In our cases of young children the sarcoma has been reduced in size or entirely eradicated, but on account of marked malignancy the patients generally die because of metastasis. By the removal of the primary

tumor, however, we believe the child's life is increased by months and sometimes by years. In adults, the prognosis is much better; we have been very much encouraged by the use of radium in these cases; but we are not

removed. Fat was taken from the abdomen and transplanted into the orbit. Over this a shell eye was fitted and worn without difficulty until one month before his examination in the clinic.

On examination a mass was found

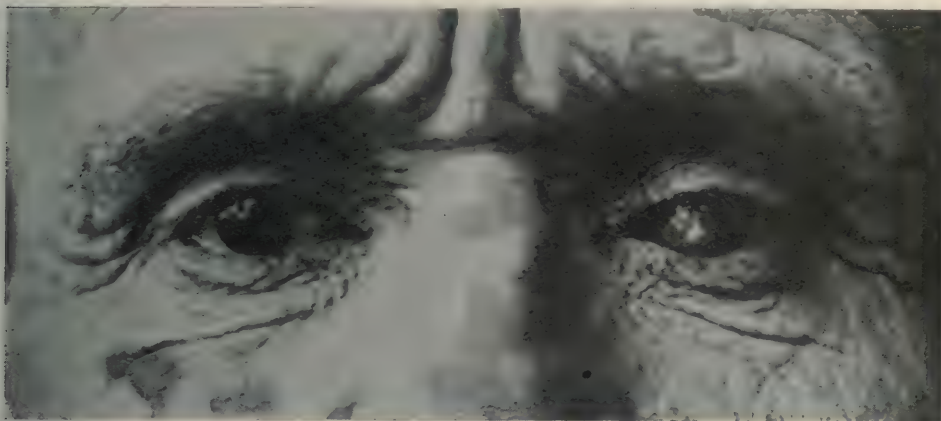


Fig. 3. Epithelioma of the cornea, May 11, 1918, before treatment with radium.

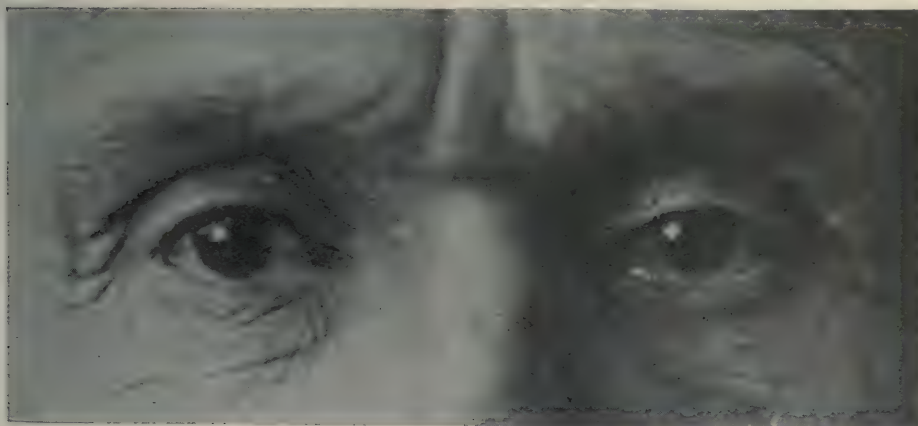


Fig. 4. Same as Fig. 3, July 7, 1918, after treatment.

able to state what the ultimate results will be.

CASE 214143. A man, aged 61, who was examined Nov. 16, 1917, had noticed diminution of vision in the right eye for eight years. He consulted an oculist, who told him that he had a detached retina. Two years later the vision in the eye was completely gone, and the intraocular tension was high. In another two years, because of frequent attacks of pain, the eyeball was

in the anterior part of the right orbit, under the lids. The palpebral fissure was open about one-quarter of an inch. The mass was covered by thickened hypertrophic conjunctiva with some edema in its lower and outer part, and a bluish discoloration over the inner third. Over the central part of the mass was another bluish discoloration 7 or 8 mm. in diameter, and slightly elevated which did not disappear under pressure. There was no tenderness or

soreness around the mass on palpitation. It was freely movable in all directions except from the lower inner quadrant; even there it did not appear to be attached to the periosteum.

The patient was able to wear a shell eye over the mass without the appearance of proptosis, but the laxity of the lower lid gave the appearance of an ill



Fig. 5. Epithelioma of right upper and lower lid, July 11, 1917, before treatment with radium.

fitting eye. The preauricular or sub-maxillary glands were not swollen or tender. The condition was diagnosed sarcoma of the orbit. Feb. 28, 1918, 50 mg. of radium were inserted directly into the tumor and left in place twenty-four hours. The patient returned for observation April 23. The greater part of the tumor had disappeared altho there was a slight thickening in the inner and lower part of the orbit. At that time 100 mg. of radium were inserted into this part of the orbit for twelve hours. The patient returned again June 26 with the condition entirely cleared up (Figs. 1 and 2).

EPITHELIOMA OF THE CORNEA.

CASE 230977. A man, aged 59, was examined May 10, 1918. One year before the patient had noticed a growth which started as a small, red elevated area near the limbus of the left eye. Growth was rapid and continued until

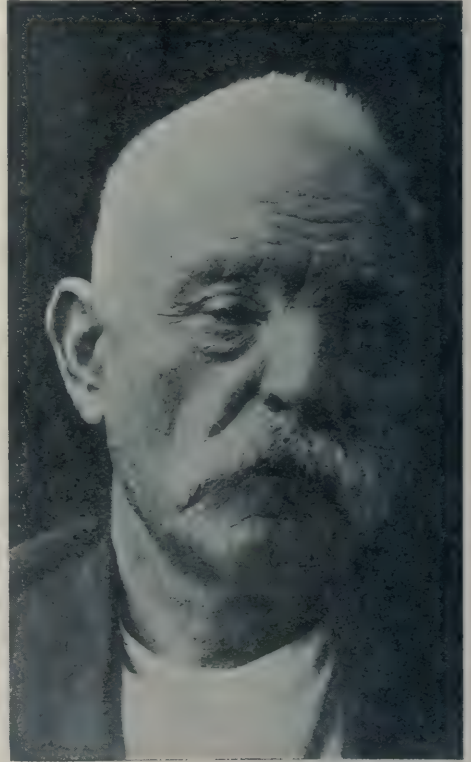


Fig. 6. Same as Fig. 5, Oct. 26, 1917, after treatment.

the nasal half of the cornea was covered by a granular, elevated, sloughing mass. Epithelioma of the cornea was diagnosed.

A 50 mg. tube of radium was used daily in half hour treatments over the area on the cornea, for a period of ten days. The eye was cocaineized, a self retaining retractor was inserted, exposing an area the size of the lesion to be treated, and the radium held in place with a lead applicator.

July 29, 1918, all macroscopic evidence of epithelioma had disappeared from the cornea. There was some roughness of the ocular conjunctiva

near the limbus, on the nasal side, which extended over on the cornea for about 1 cm. in the region previously occupied by the tumor mass. The cornea was slightly vascular and infiltrated. There was no elevation and no fibrous scar tissue. The visual acuity of 6/60, which the patient pos-

shoe shaped epithelioma, involving the inner half of both upper and lower lids and the inner canthus of the right eye. This mass was elevated, indurated, and pink. It was covered by small scabs and a greyish discharge. The palpebral and ocular conjunctiva also showed moderate congestion. (Fig. 5.)

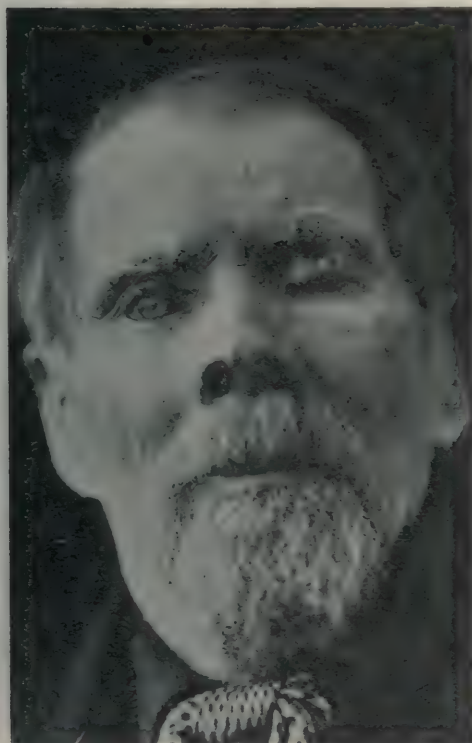


Fig. 7. Epithelioma perforating the left upper lid, Jan. 6, 1917, before treatment with radium.

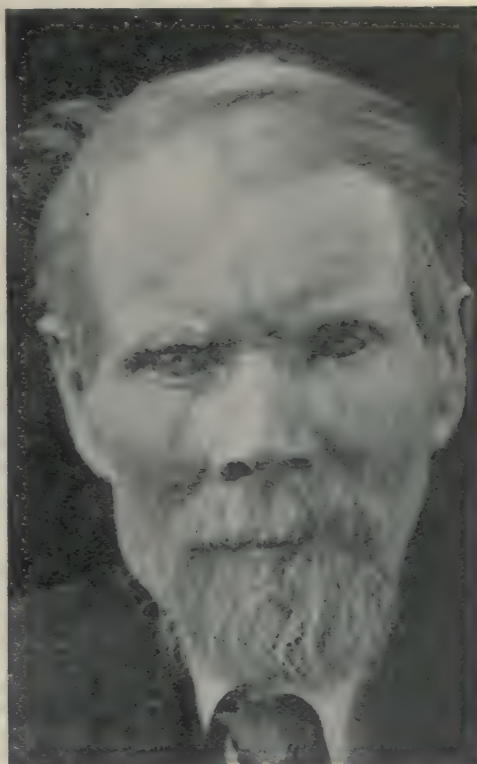


Fig. 8. Same as Fig. 7, March 27, 1917, after treatment.

sessed at the time of the first examination, was not decreased (Figs. 3 and 4).

EPITHELIOMA OF THE RIGHT UPPER AND LOWER LIDS.

CASE 200985. A man, aged 67, who was examined July 10, 1917, stated that ten years before a slight growth had appeared at the right inner canthus. Two years later, the growth having extended, a plaster was applied over it and part of the tissue removed. The lids apparently healed, but about six years later the growth recurred. On examination the lids showed a horse-

The patient was given twenty-six hours of treatment with a 50 mg. tube of radium; the treatments extended from July 12 to July 27. Two months later radium was again applied for twenty hours, a 50 mg. tube being used daily from August 31 to September 12.

The eye and surrounding tissue were protected during these applications by a 2 mm. lead screen. No screening of the radium was used, except the container, which is a silver tube (Figs. 5 and 6).

BLASTOMYCOSIS OF THE RIGHT LOWER LID.

CASE 205095. A boy, aged 17, was examined August 15, 1917, for a growth on the inner two-thirds of the right lower eyelid. This growth was about one and one-half inches long and one-half inch wide; it involved the lid margin, the conjunctiva, and the skin below the lid. The surface was scaly and brown. A diagnosis of blastomycosis was made. A 50 mg. tube of radium was applied over the diseased area on the lid, daily for six days; the total time of exposure amounted to ten hours. The eye and the tissues surrounding the lesion were protected by 2 mm. of lead. The patient was given a prescription for potassium iodid and advised to return in six weeks, at which time the growth on the lower lid was entirely cleared. A new area of the disease, however, had appeared on the right upper lid, which received ten hours exposure of a 25 mg. plaque of radium during the next four days.

December 12 the patient returned with no recurrence, but at this time the reaction from the last application of radium had not entirely subsided. A recent letter states that his trouble has not recurred.

EPITHELIOMA PERFORATING THE LEFT UPPER LID.

CASE 182293. A man, aged 76, with an epithelioma on the left upper eyelid, was examined Jan. 6, 1917. The growth had appeared nine years before, and a physician had cauterized it at intervals for the past one and one-half years. This epithelioma involved the entire upper lid, and extended into the upper part of the orbit, perforating the lid.

Twelve hours of applications of a 50 mg. tube of radium and one hour of a 25 mg. of radium plaque were given the patient over a period of ten days. The last photograph taken March 27, 1917, shows the condition to be entirely healed (Figs. 7 and 8).

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FREE DERMIC GRAFTS FOR THE CORRECTION OF CICATRICIAL ECTROPION.

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This paper gives its author's reasons for preferring free dermic grafts for the correction of this condition, and explains the technic of their application and the subsequent dressing required. Read before the American Academy of Ophthalmology and Otolaryngology, October, 1919.

Cicatricial ectropion is recognized as a difficult condition to handle satisfactorily. To get rid of the scar tissue responsible for the deformity, to cause the eyelid to lie accurately against the eyeball at the proper level, to get the effect of proper outline of the lid margins, to enable the patient completely and easily to close the lids, without adding any appreciable deformity in the process—this is not easy. On account of the exposure of the eye caused by the ectropion and on account of the glaring deformity, the correction of this condition is decidedly important. Thru the contraction of the scar tissue and the overflow of tears the tendency is for the deformity to increase, if it is not rectified by operation.

Unfortunately, no method of treatment has been generally agreed upon as superior to all others. In my mind the choice is made. For most cases of scar ectropion, transplantation of free dermic grafts offers by far the most satisfactory means of correcting the deformity. After a study of methods and comparative results obtained in wounded soldiers, no doubt is left in my mind. All of the ophthalmologists who served on the eye service at Fort McHenry while most of the lid repair work was going on, thought alike on this point, and I have reason to believe that visitors who observed cases with us were impressed with the value and suitability of the method.

Cicatricial ectropion occurs much more commonly in the lower lid than in the upper, and in war wound cases it is often associated with fracture of the orbital margin and the bony structures nearby, particularly the superior maxillary and malar bones. Often, too, the ectropion is only one of several deformities. But correction of the ectropion is always very important.

It is not my desire to deprecate the value of other methods of caring for ectropion of the cicatricial type, but I should like to make it clear that my conviction is that no other method offers correction of the deformity with as good cosmetic appearance as the use of inlays of free dermic tissue. There are two other important means of handling cicatricial ectropion, namely, the use of epidermic grafts by one of several methods, and the use of pedunculated dermic flaps. In considering the choice of method one cannot keep back the thought that the skill with which any operation is conducted is fully as important as the choice of operation. This certainly is true in regard to the matter under consideration.

But a few things are unquestionably evident. One is that, for a rule, skin characteristics are carried better by grafts made up of epidermic and true skin than can be possible by transplanting grafts of epidermis only, without the elements of true skin. Both theoretically and practically this is so. Thiersch (epidermic) grafts are best suited to cases of severe burns of the face with consequent loss of the normal color, texture and characteristic appearance of the facial tissues. In such cases the Thiersch graft is liable to match well the surrounding burned skin. Moreover, in some cases of the comparatively rare condition of ectropion of the upper lid the epidermic graft does well because it becomes inconspicuous in the shaded folds in this location. But here, even, the dermic graft gives a better cosmetic appearance, as a rule.

Pedicle flaps often fail partially of their purpose, and not uncommonly give the patient a grotesque appearance. These flaps must be taken thick or their life is imperilled. Thick flaps

are manifestly undesirable for lid grafts. Passive congestion, which leads to the death of all or parts of so many pedunculated flaps, does not have to be taken into consideration in the use of epidermic or dermic detached grafts. Their life depends on contact with the underlying tissues, and blueness and death from impairment of old circulation cannot result. Anemia in thin free grafts is quickly followed by new vascularization and vitalization,

The favorite sites for the removal of true skin for grafting are the inner surface of the arm, the temple and the upper eyelid. The arm graft is the most difficult to take, the most difficult to prepare and the slowest in assuming the characteristics of the surrounding tissues of the lids. It takes several months for the arm grafts to take on the proper color and in some cases they never do match quite accurately. The inlays from the temple



Fig. 1. Cicatricial ectropion of right lower lid. Dotted line shows position of primary incision.



Fig. 2. Upper and lower eyelids everted to show denuded areas on lid margins where adhesions will form to hold eyelids together.

provided proper contact with healthy underlying soft tissue is given.

In using pedicle flaps it is not possible, with safety for the flaps, to accurately match the needed shape, which is almost always fusiform or crescentic. This is a serious handicap, particularly in view of the fact that in attempting to correct one deformity another appreciable deformity is made and subsequent secondary operation is almost invariably necessary. Much may be said in favor of pedicle flaps for many plastic procedures, but I know of little in their favor for lid work. Right here let me add that, if I mistake not, nothing has hampered the progress of plastic surgery so much as the idea that pedunculated attachment is necessary for the life and well being of grafts.

match well in color immediately, and (if not too thick) in texture more quickly than arm grafts. The inlays into the lower lids from the upper lids match in all characteristics from the start. Little wrinkles and creases form early and two weeks after transplantation it is actually impossible in some cases to be sure of the outline of the grafts without putting the tissues on the stretch. These upper lid grafts are really beautiful and at Fort McHenry we found ourselves using them in preference to other grafts where only small inlays were used. The widest graft that we took from the upper lid was 20 mm. in width. There is no difficulty or risk in getting a length of 40 mm.

OPERATING TECHNIC. Let us assume ordinary cicatricial ectropion of

the lower lid. Restoration of the lid to its proper position, securing it in position, and preparation of the bed into which the graft is to be laid are important. A skin incision is made ordinarily a few mm. from the lid margin, approximately parallel with it and of about the same length as the palpebral fissure (Fig. 1). The subcutaneous scar tissue should be carefully and thoroly dissected out. As a rule there is more cicatricial tissue than there appears to be, and one cannot be too painstaking in getting this

lying tissue is sliced away from the lid margin with a fine knife, such as a cataract knife, at three corresponding places in the upper and lower lid margins, with care not to injure the cilia follicles. These little denuded areas should be about three millimeters long and should be placed approximately in the center and midway between the center and each end of the lid margin. It is important that the position be the same in the upper lid as in the lower (Fig. 2).

Then sutures are placed to hold these



Fig. 3. Sutures introduced to hold eyelids together. Sutures have been passed thru denuded areas on lid margins, and tied on small rubber plates.

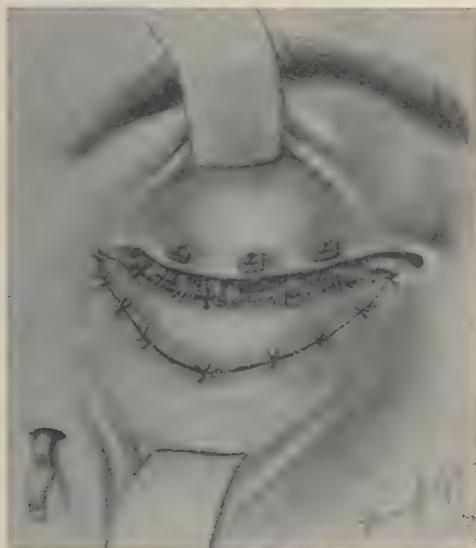


Fig. 4. Graft sutured in position. Area put on the stretch by adhesive strips. Wick drain has been introduced.

all out of the lid. Care should be taken not to injure cilia follicles, tarsus or conjunctiva, and muscular tissue should not be sacrificed unnecessarily. After this dissection is completed, the lid should easily go back into position.

If the eyeball has been enucleated the lid margin should be anchored upward and backward to the orbital contents by sutures, in a position of overcorrection. If the eyeball remains, the upper and lower lids are sewed together and made to adhere to each other. This is important. The method practiced by Weeks is excellent. The epithelium with a little of the under-

denuded areas in close apposition. Double armed sutures are used. The needles enter the skin of the lower lid near the margin and pass thru the denuded areas of the lower lid margin. Then entering the denuded areas of the upper lid margin, come out thru the skin near the eyelashes and are snugly tied. If the sutures are passed thru little rubber plates they will not cut into the skin under the dressing (Fig. 3).

After the lids are secured in this way, the raw surface which is to receive the graft should be put on the stretch by adhesive plaster above and below, or better by relaxation sutures tied over

little plates of rubber, little gauze pads, pearl buttons or some other material so that the sutures will not cut in. When this process is completed the smooth raw surface which is to receive the graft is stretched and usually of imperfect crescentic or fusiform shape. There should be no ligatures in this bed and there should be no opening into the conjunctival sac. In the dissection, pressure and pinching of vessels with artery clamps will control hemorrhage; and there need be no fear of postoperative hemorrhage, as a very firm pressure dressing is applied.

a dermic graft can be taken without taking hold of it with forceps or pinching it with anything. Traumatism to the tissues prepares them for death and not for life. I feel strongly about this.

After removal, skin from the arm is found to be elastic and it has a disagreeable tendency to curl. Skin from the upper eyelid has these characteristics to a much lesser degree, and that from the temple practically none at all. The temple skin lies flat and is very easy to handle. All subcutaneous tissue should be cut away by laying the graft on a pad of

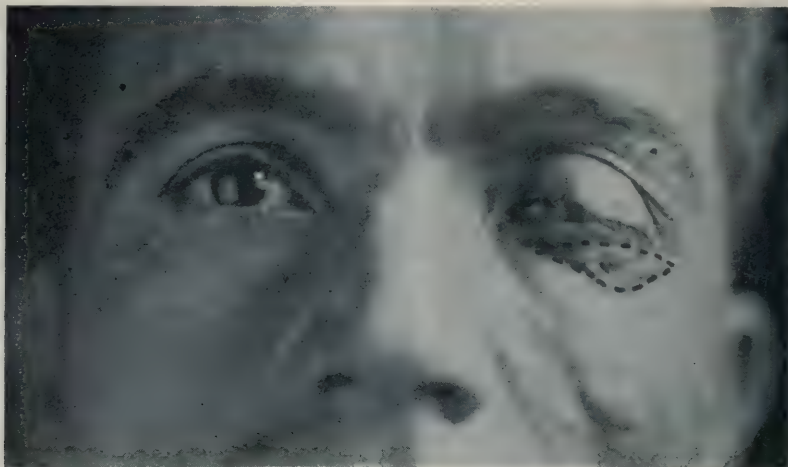


Fig. 5. Photograph taken two months after operation. Lower eyelid is supported by adhesions between lid margins. Dotted line gives outline of dermic graft.

TAKING THE SKIN GRAFT. The stretched denuded area to receive the graft should be measured, or a pattern of the area can be cut if the operator wishes. If the skin is to be taken from the inner surface of the arm the length and breadth of the graft should be about $\frac{1}{3}$ greater than those of the stretched bed on which it is to be placed. If taken from the temple or upper lid the dimensions need be only slightly greater than those of the bed, as there is practically no immediate contraction of this skin when removed. Of course in mapping out the incisions for the graft the skin should not be stretched with the fingers but left relaxed. In dissecting up the skin, care should be taken not to injure the graft unnecessarily. After practice

gauze saturated with warm salt solution, and snipping away subcutaneous tissue with flat scissors. When this is done the graft should look anemic. The temple graft looks and feels slightly granular, as well. In preparing dermic inlays one need not fear making angles or points, as they will take as surely as any part. After preparing the graft the surgeon sews it in place with interrupted sutures. These should be carried through just at the margins of graft and surrounding skin (Fig. 4). For this purpose fine silk impregnated with wax or paraffin is satisfactory. It is proper here, too, to caution against traumatism in handling the graft and surrounding tissue. Too much respect cannot be shown to the tissues concerned.

DRESSING. I am in the habit of put-

ting a very thin smear of sterile vaselin over the graft. If too much is applied there is the possibility that a little will get under the graft. Then a small piece of rubber tissue is applied with a few perforations along the palpebral fissure to allow conjunctival secretion to escape. There should be no perforations over the graft itself. Gauze fluff is then carefully placed over the rubber tissue and packed in such a way as to fill in depressions and enable the surgeon to get firm even pressure on the graft. The gauze is secured by adhesive plaster.

I like to entirely cover the dressing with strips of adhesive, putting them on like clapboards, as snugly as possible. There seems to be no danger to the graft from too much pressure. Over this should be applied a *firm* bandage, and it is well to cover the fellow eye by a separate dressing that can be removed after two or three days of absolute quiet. I cannot lay too much stress on *firm, evenly distributed pressure* on the graft from the dressing. For its life the graft is dependent on absolute contact with the underlying tissue, and parts that are not in contact will usually die. Ignorance of this idea has led to many failures in handling nonpedunculated grafts. Pressure will not interfere with capillary vascularization.

Before sewing up the wound occasioned by removal of the graft there should be free undermining of the skin, and relaxation sutures should be put in so that the margins of the skin flaps will be under complete relaxation, and marginal sutures should be put in to insure accurate apposition. "Dermal" suture

material is satisfactory for both the relaxation and marginal sutures. The relaxation sutures can be omitted if the graft is taken from the upper lid.

The dressings should be left on for four days without disturbance. In cool weather it may be wise to leave them for five days. Sutures under tension should be removed at the first dressing. Others may be left a few days more. It is important that the graft should not be disturbed in any way at the first dressing. After very careful removal of secretion with small cotton sponges, rubber tissue and dressing are replaced and a bandage applied with pressure. This may be removed again in two days and then dressings may be done daily.

It is well to keep rubber tissue over the graft for about two weeks. By this time usually the epithelium has been thrown off and the graft is perfectly secure. Massage with vaseline should then be started and continued daily until the grafted tissue is perfectly pliable, or until the adhesions between the lids are cut. These adhesions should be left for three months or more to insure complete correction (Fig. 5). Usually they stretch out somewhat, but always they keep the lid supported, and when the fellow eye is open or in the attempt to use the eye on the operated side the upward pull from the upper lid keeps the grafted tissue on the stretch and the lid in contact with the globe. Also the movements of the upper lid help to make the graft pliable. Little folds and creases develop in the graft which help to give a natural appearance. No permanent deformity results from the adhesions between the lid margins.

EARLY SURGICAL TREATMENT OF BURNS OF THE CONJUNCTIVA.

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In the case here reported the tissue burned by chlorinated lime was immediately removed, and mucous membrane from the lip used to replate it. Speedy healing and excellent result followed. This plan is advocated for cases in which there is danger of infiltration of the cornea.

In his article on "Treatment of Symblepharon, etc.," published in the *AMERICAN JOURNAL OF OPHTHALMOLOGY*,¹ Dr. Wm. H. Wilder remarks on the early treatment of burns of the conjunctiva:

"In any such case, in which the conjunctiva is destroyed in whole or in part, the eschar must be cast off before healing can begin. Granulation tissue develops to replace the lost substance and from this fibrous or cicatricial tissue forms. Two granulating apposed surfaces will certainly grow together in spite of frequent attempts to separate them, unless epithelium forms over the surface to prevent it. But it is just in such cases as these, in which the tissues have been injured by heat or the corrosive action of chemicals, that the regenerative power of the epithelium seems to be impaired."

"It is at this stage that the surgeon can come to the help of nature, and by aiding in the epithelization of the wound prevent much of the cicatrization that will inevitably produce great deformity if not checked. As soon as it is evident that the wounded surface is clean and granulation is well underway, attempts should be made to cover the raw surfaces with epithelium, for the sooner this is accomplished, the sooner will the formation of cicatricial tissue be checked."

While Wilder's article reflects the general viewpoint of waiting until granulation is well underway, I advocated as far back as 1912² immediate surgical interference for severe burns of the conjunctiva, consisting in removing the burned conjunctiva, if necessary all around the cornea and replacing it by mucous membrane from the mouth.

The majority of my cases were lime-

burns, some ammonia burns, and one was a burn caused by the contents of a golfball. As regards the limeburns, they constitute the majority of these cases and are therefore the most important. They may be divided in three groups, according to the intensity of the burn:

The mild cases will take care of themselves under the usual treatment. The severer ones may do the same, but they will require immediate grafting if some days after the accident—usually between the third and seventh day—secondary infiltrations of the cornea begin to set in. They are the result of an impairment of the quantity and of the quality of the nutritive material of the cornea, due to decomposing chemical processes in the burned conjunctiva. Only immediate surgical interference, grafting, will clear up the secondary infiltrations of the cornea, as I have seen in a number of cases.

To the third group belong such cases in which the conjunctiva is destroyed, nearly or entirely. It is just such a case I wish to report:

CASE REPORT.

Frank T., about 50 years old, entered the Lenox Hill Hospital with the history of a limeburn accident on September 9th, 1919. I saw the case about three hours after the accident had taken place. The patient stated, that while removing the top of a tin can, containing chlorinated lime, it all of a sudden "exploded," the shower of lime dust striking both his eyes. He cleaned his eyes as best he could and went to the hospital.

I found the lids of both eyes very much swollen, the right one more than the left. On forcing open the right eye, I discovered a lot of dark brown

detritus between the lids. The whole conjunctiva of the eyeball and of both culdesacs showed the same condition. I immediately proceeded to clean the eye and to remove this detritus, which on examination proved to be the remains of the destroyed conjunctiva. It was seen that the bulbar conjunctiva was destroyed in whole and that of the culdesacs very extensively burned; also the cornea showed numerous burns.

The left eye had fortunately escaped such serious damage and offered some chances of recovery without an operation, at least I decided to wait and do a grafting only if within the next few days secondary infiltrations of the cornea should occur.

As far as the right eye was concerned there was no hope, except such as an immediate transplantation of mucous membrane of the mouth could offer. This was done five hours after the accident in the presence of my assistant, Dr. Pagenstecher and of Dr. M. F. Claffey of the eye service of the Lenox Hill Hospital. The burned remains of the bulbar conjunctiva were carefully removed far into the culdesacs, both of the upper and lower lids; and the defect covered by two large grafts, one along the upper and the other along the lower circumference of the cornea. Two double grafts were used for the purpose of avoiding the contracting and encroaching on the cornea, which ensues, where a single circular graft is used.

Both eyes were covered with light linen eye pads. The right eye was not opened till the 6th day; the pads were changed three times a day, the secretion removed and a drop of atropin instilled between the lids near the caruncle once a day. The left eye was treated the same way and on the 3d and the following days was cautiously inspected to ascertain if any infiltration of the cornea were taking place; this did not occur.

On the 6th day the pads were removed; the swelling of the lids slowly went down; and the patient was discharged on the 16th day after the ac-

cident, with the left eye in good condition and the right eye doing splendidly. There was no irritation or inflammation present, the cornea looked clear, and only by the aid of focal illumination multiple nebulae could be detected, the result of the direct contact of the burning substance. A tiny adhesion, which had formed between the upper lid and the corneal edge of the flap, was cut with the scissors on the tenth day; a similar one between the culdesac of the lower lid and the edge of the graft was not touched, as it did not interfere at all with the free movements of the eyeball. The sight of the left eye, on December 28th, 1919, was 20/30. There are some nebulae to be seen in the pupillary region of the cornea, the sight of the right eye was 20/200 (irregular astigmatism).

Regarding technic I wish to refer to my article on "Transplantation of the Mucous Membranes of the Mouth for Serious Diseases and Burns of the Cornea."³

Attention has been called to the greater prevalence of burns of the eye due to the increase of chlorinated lime for household purposes.⁴

"The care of such cases usually includes anesthetization with a few drops of 1 per cent solution of holocain, or a 4 per cent solution of cocain, and then the removal of the remaining particles of the lime. The irrigating fluid should be a weak solution of vinegar to neutralize the caustic effect of the lime. Subsequently, cold applications may be applied to the closed lids, and a mild antiseptic, such as a boric acid solution, dropped into the eye every two or three hours. The most serious and important sequel is the adherence of the lid to the globe (symblepharon), when there are two opposing raw surfaces. In an endeavor to prevent these accidents, the national committee took up the matter with manufacturers and distributors. The latter report that chlorinated lime decomposes when exposed to high temperature or to dampness. To avoid accidents, it is recommended that a small

hole be punched in the container to allow the gas pressure to be released before the top is taken off the can."

I wish to emphasize once more the

necessity of *immediate* grafting, as outlined above, for severe burns of the conjunctiva, as the only way of saving eyes, that are otherwise doomed to destruction.

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THE RELATION OF THE SIGHTING EYE TO THE MEASUREMENT OF HETEROPHORIA. A PRELIMINARY REPORT.

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SAN FRANCISCO.

The investigation reported in this paper grew out of the studies of heterophoria made at the Medical Research Laboratory, Mineola, L. I. It seems to show that it is a matter of practical importance in measuring heterophoria to permit the sighting eye (that which habitually fixes an object) to fix the test; and to place the Maddox Rod in front of the other eye, thus bringing out the maximum error.

When the eyes are alternately covered and uncovered in the screen test, one eye is frequently seen to make a greater excursion of redress than the other. Occasionally a careful observer during the parallax test notices that the image jumps farther when the screen is moved in one direction than when it is moved in the other. Such observations are common in the experience of ophthalmologists who employ these two excellent tests, and some confusion not infrequently arises in trying to select a prism that will neutralize both movements. In the interest of accurate procedure it is necessary to determine which of these two unequal eye movements indicates the true deviation of the visual axes.

It is evident from the technic of the screen test that the two unequal degrees of deviation depend upon the fact, that the rôle of fixation is given to each eye in turn. The stimulus received by the retina of the eye fixing the test object determines the direction of both visual axes when the other eye is screened. A study of the problem in hand therefore depends upon an investigation of the effects of right and left eye fixation on the measurement of heterophoria.

The screen test is not easily adapted

for making the measurements desired in this investigation. The technic of measurement advocated in this test is to place prisms of constantly increasing strength before one eye, until the direction of movement of the eye is observed to be reversed. From this amount of prism, 2 is deducted and the result called the measurement of the original movement.¹ This procedure is practical for clinical use but is subject to a possible error of one prism diopter², an amount too high for the purpose of this investigation where small amounts of heterophoria must be exactly measured.

The parallax test gives an exceedingly exact result; but, being subjective in character, its success depends upon the ability of the observer to see the apparent movement of the test object when the eyes are alternately screened. The fact that some observers are unable to see this movement limits the application of the test.

Other tests for heterophoria in common use are not readily available for this purpose because their technic is such that fixation of the test object by one or the other eye is not under the control of the examiner. It was not until the Maddox Rod Screen Test³ had been in use in this laboratory for

several weeks that a means was recognized for making the desired measurements in a simple and accurate manner.

Either eye in this test may be selected for light-fixation, the other being covered by the Maddox rod. The fixing eye thruout the test is kept in the natural primary position, uninfluenced by any prism, screen or other device. The Maddox rod before the other eye is covered by a screen which is removed for an instant and replaced, allowing a brief view of the line of light. If the line does not pass thru the spot of light, a rotary prism is placed in front of the Maddox rod and rotated while other brief exposures of the line are made until finally a degree of prism is obtained that causes the line to pass thru the light every time the screen is removed. This prism is the measure of the deviation of one eye in relation to the other which fixes the light. It is obvious that a second measurement can be obtained by selecting the opposite eye for the rôle of light-fixation.

This test has been made on both eyes of 100 observers, 50 of whom were aviators and medical officers connected with the Air Service. The remaining 50 were patients in several New York Ophthalmological Clinics. The appa-

ratus used in the Medical Research Laboratory was a DeZeng phorometer trial frame, equipped with a pair of Maddox multiple rods and a pair of Risley rotary prisms. The phorometer attachment of this apparatus was not used. In the clinics, the tests were made with a trial case multiple red rod, held in position by a trial frame, measurements being made by trial case prisms or a portable rotary prism. The sighting or dominant eye of each observer was ascertained by having him locate a distant light thru a hole in a large card held in both hands.⁴

In the first half of the appended table are grouped the aviators and medical officers. The aviators were comparatively free from refractive errors which might influence the test. The medical officers were tested while wearing their refractive corrections. The second half of the table contains the data concerning the clinical patients. The visual acuity recorded for this group is not as high as for the first one. Those who wore glasses were tested with the glasses in place. The rest were free from the suspicion of having more than a moderate amount of refractive error. All individuals having a marked inequality of vision of the two eyes were excluded from both groups.

TABLE.

Abbreviations: Esophoria, S; exophoria, X; right hyperphoria, RH; left hyperphoria, LH.

No.	Age	Sex	Visual R. F.	Acuity L. F.	Sighting Eye	Maddox rod measurements when light is fixed by:		
						R. F.	L. F.	
1.	25	M	20/15	20/15	Right	S3		S2
2.	21	M	20/20-2	20/15	Right	X2		S1
3.	34	M	20/20	20/20-5	Right	S2		S3
4.	21	M	20/15-4	20/15-5	Right	S2		S½
5.	24	M	20/20-3	20/20-3	Right	X4	LH2	X3 LH½
6.	22	M	20/15	20/15	Left	S1½		S2
7.	52	M	20/15-3	20/15-3	Right	S2		S1
8.	22	M	20/15	20/20-2	Left	S1	LH½	Ortho.
9.	24	M	20/15	20/15	Either	X2		X1
10.	20	M	20/20	20/20	Right	S3		S½
11.	23	M	20/15	20/15	Left	S2		S2
12.	22	M	20/15	20/15	Left	X1		S1
13.	25	M	20/20	20/20	Right	S1		Ortho.
14.	21	M	20/15	20/15	Left	S1½		S1½
15.	23	M	20/15	20/15	Right	Ortho.		Ortho.
16.	29	M	20/15	20/15	Right	X9		X5
17.	36	M	20/15	20/15	Right	Ortho.		Ortho.
18.	27	M	20/15	20/15	Right	S4		S2
19.	30	M	20/15	20/20-6	Left	S1	LH½	S2 LH2
20.	25	M	20/20	20/20	Left	S4		S2½
21.	21	M	20/30	20/30	Right	Ortho.		Ortho.
22.	22	M	20/20	20/20	Right	Ortho.		Ortho.

23.	24	M	20/30	20/30-4	Left	S $\frac{1}{2}$	S $1\frac{1}{2}$
24.	22	M	20/20-7	20/20-7	Right	X2	X $\frac{1}{2}$
25.	22	M	20/15	20/15	Right	S $3\frac{1}{2}$	S2
26.	25	M	20/15	20/15	Right	S4	S3
27.	27	M	20/15	20/15	Right	S4 RH1	S2 RH $\frac{1}{2}$
28.	26	M	20/15	20/15	Right	S $1\frac{1}{2}$	S $\frac{1}{2}$
29.	23	M	20/15	20/15	Left	S $\frac{1}{2}$	S2
30.	25	M	20/20-5	20/20-4	Right	S2	S $\frac{1}{2}$
31.	23	M	20/20-6	20/20-6	Right	S4	S $\frac{1}{2}$
32.	26	M	20/15	20/20-6	Left	S $\frac{1}{2}$	S $1\frac{1}{2}$
33.	21	M	20/15-2	20/15-1	Left	X1	X3
34.	23	M	20/20-6	20/20-7	Right	S4	S $1\frac{1}{2}$
35.	26	M	20/20-1	20/20-3	Right	S2	S1
36.	29	M	20/15	20/15	Right	X2	X $\frac{1}{2}$
37.	26	M	20/20-7	20/20-7	Right	S3	S2
38.	26	M	20/20	20/30-5	Left	Ortho.	Ortho.
39.	26	M	20/15	20/15	Right	X4	X $2\frac{1}{2}$
40.	25	M	20/15	20/15	Right	S1 RH $\frac{1}{2}$	S1 RH $\frac{1}{2}$
41.	33	M	20/15	20/15	Right	S1	S1
42.	28	M	20/15	20/15	Right	X3	X $\frac{1}{2}$
43.	21	M	20/15	20/20-4	Right	S4	S3
44.	25	M	20/15	20/15	Right	S5	S2
45.	24	M	20/15	20/15	Either	S1	S $2\frac{1}{2}$
46.	27	M	20/20-6	20/20-6	Right	S $1\frac{1}{2}$	S1
47.	24	M	20/20-7	20/20-7	Right	X $3\frac{1}{2}$	X $1\frac{1}{2}$
48.	25	M	20/15	20/15	Right	S $1\frac{1}{2}$	S $1\frac{1}{2}$
49.	30	M	20/15	20/15	Left	Ortho.	X2 LH1
50.	22	M	20/15	20/15	Right	S $1\frac{1}{2}$	S $1\frac{1}{2}$
51.	30	F	20/20-1	20/20	Left	S8	S8
52.	11	M	20/20-4	20/20-6	Right	S $2\frac{1}{2}$	S $1\frac{1}{2}$
53.	30	M	20/30-4	20/30-4	Right	X2	X $\frac{1}{2}$
54.	31	F	20/20-3	20/20-4	Left	X3	X3
55.	34	F	20/20-4	20/20-3	Right	S17 LH2	S $9\frac{1}{2}$ LH1
56.	36	F	20/20-2	20/20-1	Right	S1	S1
57.	20	F	20/20	20/20	Right	X7	X5
58.	14	M	20/15	20/15	Right	X2	Ortho.
59.	16	M	20/20	20/20-3	Right	X2	X2
60.	10	F	20/20	20/20	Right	S6 RH $\frac{1}{2}$	S4 RHO
61.	16	F	20/30	20/30	Left	X27	X9
62.	16	M	20/20-2	20/15	Either	S1	S3
63.	10	M	20/20	20/20-4	Right	Ortho.	Ortho.
64.	9	M	20/20-2	20/20-4	Right	S $1\frac{1}{2}$	Ortho.
65.	19	M	20/20-4	20/15	Right	S2	S $\frac{1}{2}$
66.	16	M	20/20-1	20/20-1	Right	X3	X $\frac{1}{2}$
67.	11	M	20/20	20/20-4	Right	X3	X $1\frac{1}{2}$
68.	8	M	20/30-5	20/20	Left	X10	X8
69.	48	F	20/30	20/30	Right	S $1\frac{1}{2}$	Ortho.
70.	13	M	20/20	20/20	Right	S2	S1
71.	16	M	20/20-2	20/20-1	Left	X $2\frac{1}{2}$ LH $\frac{1}{2}$	X4 LH $\frac{1}{2}$
72.	21	F	20/20	20/30-4	Right	S4	S2
73.	18	F	20/20-1	20/20-4	Left	X3	X4
74.	11	M	20/20-2	20/20-2	Right	X2	Ortho.
75.	34	M	20/30-6	20/20	Left	S11	S14
76.	10	M	20/20	20/20	Right	X2	X $\frac{1}{2}$
77.	15	M	20/15	20/20-5	Left	Ortho.	S $2\frac{1}{2}$
78.	10	F	20/20	20/30-4	Either	Ortho.	Ortho.
79.	9	M	20/20	20/20-2	Left	S2	S3
80.	14	F	20/30-4	20/20	Left	S4	S3
81.	49	F	20/30	20/30-2	Right	X $8\frac{1}{2}$	X $7\frac{1}{2}$
82.	13	M	20/20-4	20/15	Left	X $\frac{1}{2}$	X3
83.	16	M	20/30-4	20/30-4	Either	X5	X3
84.	11	M	20/20-2	20/20	Right	Ortho.	Ortho.
85.	10	M	20/20-2	20/20-4	Right	S2 RH $\frac{1}{2}$	S1 RHO
86.	19	F	20/20-1	20/20-1	Either	X7 LH4	X2 LH $2\frac{1}{2}$
87.	19	F	20/20-5	20/20-2	Left	S5	S6
88.	50	M	20/20	20/20-1	Left	X3	X5
89.	18	M	20/30-5	20/30-5	Either	X2	X2
90.	17	M	20/20-4	20/15	Right	S3	S2
91.	29	F	20/30-6	20/30-6	Right	S $10\frac{1}{2}$	S8
92.	40	M	20/20-2	20/15	Right	X $\frac{1}{2}$ RH1	X3 RH $1\frac{1}{2}$

93.	35	M	20/15	20/20-5	Left	S½	S2
94.	14	F	20/15	20/20-3	Left	S2	S4
95.	13	M	20/20	20/20-2	Left	S1	S2½
96.	20	M	20/15	20/15	Right	S1½	Ortho.
97.	13	M	20/20	20/20-2	Right	X3 RH1	X2 RH½
98.	18	M	20/20-2	20/20	Left	Ortho.	Ortho.
99.	15	F	20/20	20/20-2	Either	X2½	X1½
100.	31	F	20/20-4	20/20-3	Either	X3	X3½

The test for the sighting eye demonstrates that 61 observers (61%) use the right eye, 30 (30%) the left and 9 (9%) sight with either the right or left eye without showing a decided preference for either.

Attention is called to the fact that 81% of these observers give two different measurements of the same type of heterophoria as a result of fixation of the light by each eye in turn. This percentage is very much higher than experience with the screen test has indicated.

The data concerning the amount of esophoria, exophoria and hyperphoria, measured when each eye is used to fix the light, may be rearranged for the purpose of studying several different phases of the subject of heterophoria. This report, however, is concerned only with the relation of the sighting eye to the measurement of heterophoria. Out of 61 right-eyed observers, 47 exhibit the greater amount of some form of heterophoria when the right eye fixes the light. Of the 26 left-eyed observers, 19 exhibit the greater amount of error when the left eye fixes the light. The table indicates that when the sighting eye is used to fix the light during the test, the greater amount of heterophoria is exhibited by 66% of the observers, the lesser amount by 7% and the same amount by 17%.

Further analysis of the data does not help determine whether the greater or lesser amount of error represents the true condition of the eyes. If the pur-

pose of the heterophoria test is to measure the maximum error, then the greater amount revealed by giving the sighting eye the rôle of fixation indicates a practical method of performing the test. This will give the greater amount of error in 66% of the tests and be accurate in 17% more where the same amount of error is recorded for each eye. It is possible then in 83% of the tests for heterophoria made by the Maddox rod screen method to measure the maximum error by having the sighting eye fix the light.

In criticism of these percentages it should be stated that the measurements obtained in testing some of the observers are not free from the influence of small refractive errors. It was not possible in this series to refract every observer as a preliminary to the test. The influence of slight turning movements of the head is not entirely eliminated from the findings, altho head movements were guarded against as much as possible without actually fixing the head.

The hundred observers reported here are not enough to bring this problem to a definite solution. Meanwhile, pending the reporting of further tests, no mistake will be made if the Maddox rod is always placed before the non-sighting eye, instead of before the one that happens to be nearer the trial case. The rôle of light fixation should be given to the eye that is used habitually for sighting in the ordinary visual acts of life.

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TUBERCULOSIS OF THE EYE IN THE ARMY.

H. H. STARK, M. D.

EL PASO, TEXAS.

This paper, based upon the personal experience of the writer at Camp Travis, points out why, in spite of careful examination of recruits, tuberculosis was an important disease in the army. It reports eight cases with some discussion of each. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology, Denver, August 4, 1919.

A casual observer would think that with the repeated examinations of the men chosen to make up the national army—first, by the local examining board, many times by an advisory board, as well as the general and special boards on arrival at camp, no cases of tuberculosis would be found among them. We have only to remember, however, that most of us are but arrested cases, and that these men, who have undergone intensive training, may again become active. Even should activity begin, when the period of training passes, a readjustment takes place and when they have recovered their former weight and resistance, the activity may subside. In the limited number of cases I have treated, I have seen new lesions and new lesions ingrafted on old ones, and I feel there have been many cases of slight activity which have been overcome without the knowledge of the individual.

The handling of tuberculous eye cases in the army was quite a problem. There is a specific order in the manual against the use of tuberculin in the diagnosis of tuberculosis of the lungs. However, the interpretation of the paragraph dealing with this question was thought not to apply to eye cases. The Chief of the Medical Section kindly consented to the use of tuberculin for both diagnostic and therapeutic purposes, so the work was turned over to this section, to be handled under my direction.

One of the questions which was very hard to settle was the length of time this treatment should be continued. It seemed inadvisable to keep the soldier in the hospital, idle, apparently healthy, for a number of months in order to receive one dose of medicine, weekly, long after the acute condition had subsided. It was therefore decided to return them to duty within a short time after the acute stage had passed. Since treating these cases

a number of these men have been discharged from the army. They had no means of continuing the treatment, nor were we permitted, by the regulations, to disclose the nature of the disease. I therefore believe that it is quite possible that some of them may relapse. Should they do so, they will, no doubt, come under the care of the War Risk Insurance Bureau and be handled, in the majority of instances, by the civilian oculists.

CASE REPORTS.

The following cases came under my care while stationed at the base hospital, Camp Travis, during the winter of 1918-19. They show the class of cases met with among the drafted men, and as each one has special features, I shall give the history and discuss it separately. All of them were privates with the exception of one, who was a noncommissioned officer.

CASE 1. Reported at the clinic, November 15, 1918; age 19; white; in the service 5/12 years; from New York state; occupation before entering the service, small arm polisher; general appearance, good, but had a facial expression indicating adenoids in childhood; family history negative; had diseases of childhood, otherwise negative except the right eye.

History. He had trouble in his right eye 1½ years ago, which was diagnosed as iritis. This cleared up under treatment in about two months with no trouble up to two days before reporting at the clinic when he noticed some pain and redness.

Examination. Right eye, vision 20/50, with all the characteristic signs of acute iritis; fundus, negative, as well as could be determined through the contracted pupil. Left eye, vision 20/20, examination negative. The right eye was placed on atropin, but the pupil refused to di-

late fully, a large synechia up and out holding fast. This condition continued thruout his entire treatment. A routine examination was carried out; ears, nose and throat, teeth, genito-urinary tract, lungs, urine, blood, and provocative Wassermann, all negative. The condition of the eye would be fairly good for a day or two, then it would become very red and painful. Five days after his entrance there could be determined slight elevation of the right disk.

All examinations proving negative for the cause of iritis, consultation was held with the Chief of the Medical Section, who consented to the administration of diagnostic doses of tuberculin. This was the first case ever tested in this hospital, and as the eye was very much inflamed, there was fear of a too decided reaction, so it was thought best to approach it with caution. Accordingly, after the preliminary steps of recording the temperature for 48 hours, which was negative, an initial dose of 1/100 milligramme was given. There was no reaction other than a decided improvement of the condition within 48 hours, at which time he was given 1/10 milligramme, which caused additional improvement. At the end of 48 hours, 1 milligramme was given with no reaction, followed again by two milligrammes in 48 hours, the result of which was a general, focal and local reaction, the temperature rising to 100. A medium sized red spot appeared at the point of injection and the eye showed increased redness. Total amount administered 3.11 milligrammes. During the course of the administration of the tuberculin, the eye made such rapid improvement there was little redness left, so the focal reaction could be readily determined. At the time of the reaction there occurred an increased swelling of the disc amounting to about 5D.

The patient was placed on therapeutic doses of old tuberculin two weeks after the final diagnostic dose, the first being 1/10,000 milligramme, which was increased by this amount each week until the last dose, which was 5/10,000 milligrammes. Under this treatment the eye cleared and the swelling of the disc subsided. During the course of handling this patient in the hospital, his vision

went down to 20/200, going up to 20/70 during the testing with tuberculin. On January 30, 1919, he was returned to his organization which was leaving camp for their home station to be discharged. At this time the vision of the right eye was 20/40, corrected to 20/30 with glasses.

Discussion. This was the first case since entering the service in which I used tuberculin, and it was the first case of the kind treated in the hospital. The case had been under treatment several weeks with no improvement—in fact the eye seemed to be getting worse—so I felt that something must be done. In considering it, I was sure that the head of my section in the Surgeon General's Office would approve of my using any procedure in the army which I would use in private practice. The Chief of the Medical Section consented to its use and one of the younger officers of the section was detailed to carry out the test, and from that time on he continued handling cases of this character until he was discharged.

The initial dose was smaller than usually employed, but it proved to be a very wise precaution, as it acted as a therapeutic rather than a diagnostic dose. The nerve condition is not altogether clear in my mind; whether it was due to a direct involvement of the nerve, or of the orbit, I am unable to say. The increased swelling after the reactionary dose clearly indicates, to my mind, that it was of tuberculous character, which was proven by the subsiding of the swelling on continuing the treatment. The case passed from under my observation when his organization returned to its place of enlistment for demobilization. The condition of the eye was such that he could have passed out of the service. However, I think it would have been much better to have continued the treatment for a number of months, as the condition was, no doubt, a recurrence of a former tuberculous iritis.

CASE 2. Reported at the clinic January 3, 1919; age 25; white; in the service 9/12 years; from Oklahoma; occupation, clerical work; appearance good; family history, negative; had some of the diseases of childhood, but since that

time had never been sick in bed; gonorrhea twice in 1917, both brief attacks; never had a sore on his penis.

History. He could see well with both eyes up to ten years ago, when he noticed black spots before the left eye. This did not bother him much up to about $3\frac{1}{2}$ years ago, when, within a few days, he became almost blind. The eye at this time became red but there was no pain. The first attack subsided in about two months, but the vision did not return to normal. Since that time he has had a number of similar attacks, and had been under treatment for two years before entering the service, during which time several negative Wassermann tests were made, notwithstanding which he was given one dose of salvarsan, possibly a provocative test. There was no improvement in the sight under treatment. He entered the army with a vision of 20/100; since his entrance he had two attacks where the sight became suddenly very obscure, one of these occurring two days before reporting at the clinic.

Examination. Right eye, vision 20/30; normal in appearance; fundus normal. Left eye, vision 10/200. Thru the dilated pupil there showed so many fine vitreous opacities that the nerve could only be seen indistinctly, but at the lower part of the fundus was a large, grayish, white mass, about six times the size of the disc, slightly oblong in shape, in a horizontal direction, slightly elevated in the center, with some pigmentation at the edges. Over this mass at the edge, ran several small retinal vessels. Transillumination negative. The pupil was dilated with atropin and a routine examination started. Ears, nose, throat, teeth, genito-urinary tract, lungs, and Wassermann, negative. No marked variation in temperature for three days.

As in the former case the initial dose given was 1/100 milligrammes old tuberculin, followed successively each 48 hours by one, three, five and eight milligrammes, a total of 17.01 milligrammes. On the last dose, the three reactions occurred. The vitreous cleared under the use of atropin and diagnostic doses of tuberculin to such an extent that the fundus could be plainly seen. On the

day of the last dose, there was a vision of 20/70, improved to 20/30 with a pin hole disk. Two weeks after the last diagnostic dose, treatment was commenced with 1/10,000 milligrammes old tuberculin, increasing the same amount weekly until the final dose, which was 5/10,000 milligrammes, at which time he passed from under my observation, due to discharge from the army. The elevation of the choroidal spot had subsided and most of the vitreous opacities had disappeared. Uncorrected vision, thru normal pupils, 20/30.

Discussion. I consider this case tuberculoma of the choroid. It is worthy of noting the rapidity with which the improvement took place after bringing the patient up to the point of saturation, the vitreous opacities disappearing very rapidly even before the maximum dose was reached. When the patient was discharged from the hospital, they were very fine and dust-like, through which all parts of the fundus could be plainly seen. The sudden loss of vision I ascribe to hemorrhages which would slowly clear by absorption. Another point is that the soldier entered the service with a vision of 20/100, which was reduced to 10/200 while in the service, but fortunately improving to 20/30 before his discharge—a better vision than he had had for many years. Owing to the size and character of the lesion, I think his trouble is more apt to recur than if the lesion were smaller, and that this patient should have continuous treatment with tuberculin and have close watching for a number of years.

CASE 3. Reported at the clinic January 3, 1919; age 26; white; in the service 11/12 years; from Texas; occupation, clerical work; narrow face with some appearance of adenoids; family history, negative, had diseases of childhood, nothing since; gonorrhea in 1912, lasting three or four weeks; three months before had an infected finger on left hand, resulting in loss of the nail, at which time he was treated for syphilis, altho no blood test was made.

History. First noticed trouble with his right eye about eight days ago, but did not pay much attention to it. He was up for discharge and the condition of

the eye was noticed when he came before the examining board, which sent him to the hospital.

Examination. Right eye, vision 20/70. Very red with all the symptoms of acute iritis. The pupil was bound down tightly in many places by synechia, in fact almost totally fixed, there being one place of about 1/5 of the diameter which dilated under atropin. Left eye, vision 20/20, fundus negative. He was put thru the routine examination, nose, throat, genito-urinary tract, lungs, Wassermann and provocative Wassermann, negative. The teeth were negative to focal infection, but showed Vincent infection of the gum margins, for which he was placed under treatment and reported negative in a short time. Wasserman test was repeated several times on account of his history, but was always negative.

Notwithstanding the negative Wassermann, it was decided by the Genito-Urinary Section that it was best, considering his history, to put him on anti-syphilitic treatment, which was agreed to. He had salvarsan and mercury, with increasing doses of potassium iodid up to 50 drops of a saturated solution, three times a day. Under this treatment there was no improvement in the condition of the eye. On February 16th, 44 days after his admission, iritis developed in the left eye. The pupil was dilated and at the temporal side of the fundus was found a white exudate, triangular in shape, the three points corresponding to the size of the disk. Near this were numerous small, round, hemorrhagic spots, covering an area about 8 times the size of the disc, quite fresh in appearance. Further, towards the temporal edge of the fundus, was some fine, old pigmentation, which had been overlooked on the first examination.

The patient was at once started on diagnostic doses of tuberculin, one, three and five milligrammes, each 48 hours; total, 9 milligrammes. The reaction occurred on the last dose, showing in the left eye by an increase in the size and brightness of the hemorrhagic spots, and a general lighting up of the inflammation in both eyes. The patient was put on old tuberculin, 1/10,000 of a milligramme once a week, increasing this amount each

dose. The condition subsided so rapidly that after the second dose the patient was discharged to duty, and within a short time from the army, with vision in the right eye 20/20; left eye 20/20.

Discussion. This was the third case treated and for some time it was thought from his history to be due to syphilis, the patient not making as positive a denial as he should. Had the first eye cleared before the trouble in the second developed, he would have been returned to duty with a diagnosis of syphilitic iritis, and dismissed from our minds as such. But his trouble in the second eye rather forced us to take other ground, which was very fortunate for the patient. More attention would have been paid to the possibility of tuberculosis had not the old pigment been overlooked in the first examination. I feel that this case should be kept under observation for years, as he undoubtedly has a low tuberculous balance and the trouble may redevelop at any time. Just what effect the potassium iodid had on the patient is hard to say, but it is possible it may have been the cause of the redevelopment of the trouble in the second eye, either by loosening up the infection in the eye or some other part of the body. He gave no history of former trouble, so the left eye must have been a spontaneous cure, some time during his life.

CASE 4. Entered hospital January 28, 1919; age 26; white; in the service 8/12 years; occupation, farmer; from Texas; father dead from unknown cause; otherwise family history negative; had diseases of childhood, no other illness except fracture of left arm and injury since entering the army; denies any venereal history.

History. Entered the hospital with a history of gunshot wound of the lower third of the right thigh, received while in action in France. Wound was practically healed when he reported to me on March 5th. Stated he had no previous trouble with his eyes up to a week ago when he noticed sight of the right eye failing. There had been no pain or redness.

Examination. Right eye, vision, 20/200. Thru dilated pupil could be seen a slight spot of white exudate about one-quarter the size of the disc, slightly

up and in from the macula. Left eye, vision 20/20, fundus negative. Routine examination of nose, throat, teeth, genito-urinary tract and Wassermann, negative. Diagnostic doses of old tuberculin were commenced. The first dose of 1 milligramme was followed successively each 48 hours with 3, 5 and 8 milligrammes, a total of 17 milligrammes. With the last dose there was a temperature rise to 99.4, with focal and local reactions. The exudate, which had flattened out to some extent under the use of atropin, to almost the level of the surrounding tissues, again became swollen and a large amount of exudate was thrown out around it, taking on the appearance of cotton. This subsided, in about ten days, to the flat appearing spot it was before the administration of the diagnostic doses. Injection of old tuberculin was commenced with 1/10,000 milligramme, increasing doses. The case passed from under my observation after the second dose was given, owing to my leaving the service, at which time there was no change in the vision.

Discussion. I would judge that the development of the condition was due to intensive training, hard work on the fighting line, combined with the lowered resistance produced by the soldier's wound. I would consider the prognosis unfavorable owing to the location of the infected area being so near the macula.

CASE 5. Reported at the clinic February 28, 1919; age 25; white; in the service 16/12 years; born in Italy but lives in Texas; occupation, telephone lineman; father, accidentally killed; mother, dead twenty years, cause unknown; one brother killed in France. Said he had never been sick in his life, denies venereal history.

History. Stated he could always see well up to September, 1918, when he noticed the vision of his right eye was getting bad. At this time the pupil became dilated and remained more or less so ever since. Shortly after this he was placed in a base hospital, where he was under treatment for about three months, when he was sent to another base hospital for an S. C. D., but was returned to duty. He again entered the first hospital and was then transferred to another

hospital, and then ordered here. During the treatment at the different hospitals he had had his blood tested a number of times and had treatment for his eye, but with no improvement. A transfer slip from the last hospital confirmed his statements.

Examination. Right eye, vision 20/70 with plus 1 sphere equals 20/20; with plus 3 sphere added reads 0.75 at 14 in. Pupil larger than normal, reacts very slowly to light and accommodation. Fundus examination disclosed that between the disc and the macula, slightly up, were two light brown patches of chorioiditis with a few spots of pigment at the edge. In the neighborhood of the larger areas were several white small spots of the same character. Left eye, vision 20/20. Routine examinations were all negative.

Diagnostic doses of old tuberculin, 1, 3 and 5 milligrammes each successive 48 hours, were given, a total of 9 milligrammes. With the last dose there was a general reaction, temperature going up to 101.4, with a decided local reaction. The focal reaction was slight, but became more pronounced within the next 24 hours, so that there could be no doubt about it. This case was placed on therapeutic doses of old tuberculin, but also passed from under my observation when I left the service, at which time there had been no material change in the conditions.

Discussion. In addition to the positive reaction from the diagnostic doses of tuberculin, we had the evidence of the dilated pupil, which is occasionally found in tuberculous individuals, even with no other eye involvement. Just how frequently this occurs I am unable to say. In a personal conversation with the officer in charge of our tuberculous cases, he stated that he had seen it twice in 700 cases that had passed through his hands. It is usually ascribed to an involvement of the sympathetic system, caused by pressure from enlarged glands. The fact that this case, in addition to having the dilated pupil, also had loss of accommodation, would undoubtedly mean that there was partial involvement of the third nerve.

CASE 6. Reported at the clinic Feb-

ruary 28, 1919; age 25; white; in the service 2 years; born in Michigan, lives in Chicago; occupation, clerk; father dead from cause unknown; other members of family well; had measles, mumps and scarlet fever in childhood; no other illness; denies venereal disease; facial expression that of one suffering from photophobia.

History. States that he has had numerous attacks of photophobia during his life, from which recovered in a few weeks. During the last two years he had been in the hospital 17 weeks, the present being his fifth attack within the last year. An attempt had been made to overcome this condition with tinted glasses, which was not successful.

Examination. Right eye, vision 20/100; marked photophobia, with a small opacity in the center of the cornea. Examination of the fundus was difficult owing to the photophobia, but at this time nothing abnormal was found. This was confirmed by a later examination. Left eye, vision 20/50; marked photophobia; cornea clear; fundus negative. Routine examination negative. Diagnostic doses of old tuberculin, 1, 2 and 3 milligrammes each 48 hours were given, total 6 milligrammes. On the last dose there occurred a general, local and a slight focal reaction, sufficiently marked to warrant placing the patient on therapeutic doses. The last given under my direction was 2/10,000 of a milligramme. This patient passed from under my observation owing to my discharge from the army, at which time he had vision in the right eye, 20/50; left eye, 20/20.

Discussion. There may be some doubt about this case being one of tuberculosis, as it is not very clear cut. However, all other causes for the condition being negative and the reactions from the diagnostic doses of tuberculin prompt, with a smaller dose than is usually given, leads me to believe that we were possibly dealing with a tuberculo-toxic condition. The corneal opacity was not typical of tuberculosis, but it was a well defined area in a perfectly clear cornea, which is suspicious. On the other hand, the history of the patient shows that there had been spontaneous improvement a number of times without treatment, so

there may have been a mistake in the diagnosis.

CASE 7. Reported at hospital February 20, 1919, on a transfer; age 23; white; in the service 7/12 years; from Arizona; occupation, cowboy; diagnosis, chronic tuberculosis, involving upper lobe of both lungs; family history negative for tuberculosis; had whooping cough and measles in childhood; typhoid six years ago, no pneumonia or pleurisy; subject to coughs and colds; denies venereal disease; weight 200 lbs.

History. He stated he was born in Arizona, where he had always lived; that he was perfectly well on entering the service on May 1st, at which time he passed his entrance examination. He was in training 33 days when he was sent overseas. He did not remember whether he took an overseas examination or not. He became sick on board ship with something like rheumatism and on landing was placed in a hospital in Liverpool, where he remained in bed next to a man who had hemorrhages. He was in the hospital for three months, losing weight and becoming so weak that he had to be lifted out of bed. He left England in September weighing 150 lbs. On his return to this country he was placed in an army general hospital for the treatment of tuberculosis, since which time he has been under treatment for that disease and has regained his normal weight of 200 lbs.

Regarding the eye, he stated that he had always had good vision until about two months ago, when he noticed he could not see as well with his right eye as formerly, since which time the vision had been growing steadily worse. His brief showed that he had some fine moist rales in the upper parts of both lungs.

Examination. Right eye, vision 20/50; conjunctiva red, moist and a general sticky appearance of the lids, but no secretions; pupils normal in size and reaction, but dilated slowly under homatropin; vitreous cloudy, with several large, bright white spots floating in it; on the nasal side of the fundus is a flame shaped white exudate. Left eye, vision 20/20; conjunctiva, same appearance as the right eye; pupil dilated slowly under atropin, no fundus change found.

Routine examination of this case was negative. Owing to his history, no diagnostic dose of tuberculin was given.

On consultation with the surgeon having the case under his care, I was told that the patient had had normal temperature for some time and the activity in his lungs was very slight. It was therefore thought advisable to start with an initial dose of 1/500,000 of a milligramme, from which we had no reaction. The next doses were successively 1/200,000, 1/100,000 and 1/50,000 of a milligramme. Following the dose with 1/50,000 milligramme, the left eye became painful and red.

The pupil was dilated with atropin showing iritis, with two synechia, one of which broke loose under the effect of the drug, the other remaining fastened. In the angle of the anterior chamber in line with this large synechia was a white exudate, taking up about 1/6 of the curve of the cornea, with a rather prominent vessel running across it. Shortly after starting the treatment of the eye, the lung condition was pronounced inactive and the patient was transferred to the eye ward, where I left him on my discharge from the service. The condition of the right eye had improved; the left was apparently stationary. I advised the continued use of small doses of tuberculin.

Discussion. I consider this case interesting from the standpoint of general tuberculosis, as well as from the eye. I am well acquainted with the country where this boy was reared and I do not believe there is any section in the United States as free from tuberculosis. There is no doubt in my mind that he either did not develop immunity, or if he did, that it was very slight. It is a doubtful question whether an old lesion became active in the training camp, or, as he thinks, he became infected while in the hospital in England. Wherever it was the action was very rapid, due to his lack of resistance.

I feel positive as to the correct diagnosis of the eye condition. The development in the first eye and its general appearance was typical. The second eye looked normal, but a reaction occurred

with 1/50,000 milligramme of old tuberculin. The large synechia and the exudate in the angle of the anterior chamber were no doubt tubercles undiscovered up to the time of the reaction. The point of saturation of this individual was very low owing to the great number of antibodies developed by the lung condition. Much to my regret I left the service before this case was completed. I believe that the patient should be continued under this treatment for many months and kept under observation for several years.

CASE 8. Reported at the clinic March 22, 1919; aged 19; white; in the service 2 years; born in Georgia; occupation, student; family history, father not well, cause unknown; 3 brothers died in infancy; 3 sisters died in infancy. Personal history, had had whooping cough, measles and mumps about age of ten; influenza in September 1918; denies venereal history.

History. Had good eyesight up to November 18, 1918, when he noticed, one morning, that there was a cloud before the left eye. The next day it was so bad he could hardly see. He reported to the regimental infirmary in November and was sent to the base hospital where he stayed until the middle of January, 1919, when he was returned to duty with the sight unimproved. During his stay in the hospital they made 8 blood tests and 3 spinal fluid examinations, of which one spinal was reported positive. Treatment while he was in the hospital was anti-syphilitic.

Examination. Right eye, vision 20/30; some fine changes in the macula. On the nasal side of the fundus was seen a large white spot of inactive choroiditis. Slightly up and in from this was another spot of similar character. * Between the two, connecting them, ran a line of white exudate over the retinal vessels, similar to retinitis proliferans. Over the vessels of the nerve was some fine, white exudate, very indistinct. He was not aware of ever having trouble with this eye. Left eye, vision 10/200. On the temporal side of the fundus was a large white, elevated spot of choroiditis, apparently inactive, fairly well covered with exudate. In the neighborhood of

this were many small light brown spots. The nerve showed a white exudate, quite marked in character; vitreous opacities numerous, but not enough to interfere with a good view. Routine examination was negative. Diagnostic doses of old tuberculin, 1, 3, 5 and 8, a total of 17 milligrammes, were given with no reaction. Acting on my advice, another dose of 8 milligrammes was given the day I left the service, of the result of which I am not aware.

Discussion. From the general appearance of this case I believe that we are dealing with an obsolescent, inactive tuberculosis, and that it would take a large amount of tuberculin to bring the patient up to a stage of saturation sufficient to get a reaction. Even should the diagnosis be made, I consider that there is very little hope of improvement in the left eye. However, it is possible that thru its use we can develop sufficient immunity to prevent a recurrence of the trouble in the right eye. I strongly advised continuing this patient under observation and investigation for a long time.

CONCLUSIONS.

1. According to modern teaching practically every individual has been infected with tuberculosis some time in his life. This infection is overcome by a passive immunity which may last until it is disturbed by excessive physical exercise, mental strain or disease, at which time there may be a relighting up of old infected areas.

2. The age from which the recent army was selected, the military training, the mental strain and other conditions were such as to be conducive to the redevelopment of any latent tuberculous foci.

3. Should these conditions be found among the soldiers, treatment should be directed along the same line as that followed in civil practice.

4. Owing to the limited amount of treatment it was possible to give cases of this character, relapses are possible and should be carefully looked for, and the same line of treatment continued in civil life.

PRACTICAL CONSIDERATIONS IN CONNECTION WITH INSUFFICIENCY OF CONVERGENCE OF THE VISUAL AXES.

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OMAHA, NEBRASKA.

This paper reviews the causes, symptoms and diagnosis of convergence insufficiency, and advocates its systematic treatment, by correction of ametropia, systematic exercises and operation to shorten or tuck the relaxed tendon. Read before the American Academy of Ophthalmology and Oto-Laryngology, October 17th, 1919.

By the term "insufficiency of convergence" is meant in this paper insufficient action of the adductor muscles of the eyes in securing and maintaining with ease the necessary degree of convergence of the visual axes in the coordinated muscular action required to secure single vision for points within infinity. A sharp distinction must be drawn between convergence insufficiency, in which single vision is possible under effort, up to a very finite distance from the eyes, and external strabismus in which a fixed angle of divergence exists between the visual axes, which renders single vision im-

possible whether at finite points, or at infinity. Conditions of paresis are eliminated from this discussion.

Admitting then the existence of convergence insufficiency, as a pathologic entity affecting the visual apparatus, what is the essential nature of such condition? The adductor muscles, the ciliary muscles, and the sphincter pupillae are supplied with innervation thru the third nerve, the ciliary muscle and sphincter pupillae being supplied by this nerve thru the ophthalmic ganglion.

The nucleus of origin of the third nerve is situated in the floor of the

fourth ventricle beneath the aqueduct of Sylvius. This nucleus, there being one on each side of the median line for its corresponding nerve, is a collection of ganglionic cells, from which the bundles of fibers, constituting the third nerve, proceed to the ocular muscles. Fibers ascend, also, from this nucleus to the angular gyrus of the cerebral cortex, which is supposed to contain the centers for the voluntary associated movements of the eyeballs (Bernheimer, Fuchs). Thru a higher center, not yet located, but which is thought to be in the angular gyrus, it is generally assumed that the convergence of the two eyes is so coordinated as to secure single vision for points within infinity.

Convergence is also associated with accommodation, both functions being, as before noted, under the direct control of ganglion cells in the nucleus of origin of the third nerves, and coordinated by the action of a higher center, or centers.

This relation of convergence and accommodation was forcibly dwelt upon by Donders many, many years ago in advancing his views concerning the cause of internal strabismus, and is familiar to every oculist. Any condition which may have the effect of altering this relation between convergence and accommodation, as uncorrected errors of refraction, for instance, may be sufficient to induce convergence insufficiency.

Landolt estimates that there must be in reserve for work at any given finite point, twice as much power of convergence as that required for securing single vision at that point, a fact which must be borne in mind in estimating the amount of convergence necessary for our patients.

CAUSES OF INSUFFICIENCY OF CONVERGENCE. The following are considered possible causes of this condition by various observers:

1. It may be caused by a lesion of the brain or spinal cord, (Landolt).

2. It may be a result of the neurones. Neurasthenia may be particularly responsible. (Landolt).

3. Anemia, or some debilitating disease, may be the cause, (Landolt).

4. A real weakness of the internal recti muscles of congenital origin may be responsible, (De Schweinitz, Landolt).

5. Errors of refraction and disturbance of accommodative efforts may induce the condition, (Landolt, De Schweinitz, and many other observers).

6. Faulty attachment of the muscles, (De Schweinitz).

7. Excessive action or spasm of opposing and dominating muscles, (De Schweinitz).

8. Disturbances of innervation, (Gould, De Schweinitz, Tscherning, Hansen Grut).

While all of these assigned causes may play a more or less important part in inducing convergence insufficiency, the most important factors are now considered by most observers to be those connected with the innervation of the muscles connected with the function of convergence.

Hansen Grut and Tscherning attribute this insufficient convergence *not* to *absolute weakness* of the internal recti muscles, for if this were so, the associated muscular movements of the ocular muscles in other functions, would be interfered with, but to *defective innervation*. Tscherning says in his *Physiologic Optics*, "It is not in the muscles; it is in the innervation of convergence that we must seek for the cause of the deviation".

SYMPTOMS: The symptoms enumerated here have been formulated from my own experience. Marked ocular and mental fatigue, after short use of the eyes in near work, is generally the first symptom. The print may become dim, and the letters overlap each other, or become mixed. Upon looking at the hands of the watch, or the marks on the dial, they may seem to broaden and then regain their normal width, and then to broaden and broaden again, showing a tendency to diplopia. As the condition becomes more established, increasing efforts of convergence will be necessary to avoid double vision, and after using the eyes for a short while in near work, a feeling of intense nervousness in the spine be-

tween the shoulder blades may manifest itself, with an impulse to throw away the book or paper under observation.

In walking, the ground at the patient's feet may seem to oscillate and giddiness may result, and a similar oscillation may be noted in looking at objects around the room when indoors. Headaches may be frequent, at times resembling migraine. Nausea and dizziness may result from close use of the eyes. In locomotion the patient may feel as though he were going to fall forward or to either side. Tender spots frequently make their appearance along the spine in the cervical and dorsal regions, and paresthesia may manifest itself in the form of burning spots, or areas, on the arms and forearms, or along the spine. A feeling of fatigue and drawing just back of the mastoids is frequently complained of.

Very often in consequence of these nervous manifestations, the fear of organic disease may be induced in the minds, both of patient and attending physician. Great mental depression and hypochondriasis are prone to come on, and add to the troubles of the patient, until finally the victim may pass into a condition of almost confirmed invalidism.

These nervous symptoms are due to the great "nerve leakage," if I may be permitted to use such an expression, resulting from the never-ceasing spurring on of the flagging convergence, to avoid diplopia, and will disappear upon the correction of the convergence insufficiency.

Finally, in extreme cases, the positive convergence may be so weakened as to render single vision impossible for points within a useful working distance for any length of time.

DIAGNOSIS: 1. Cover test. The use of this well known test for both distance and the near point will serve at least to create a suspicion of convergence insufficiency in the mind of the examiner.

2. Examination to determine the *existence, or nonexistence of heterophoria*.

With the test object, a candle flame or point of electric light, at twenty feet the use of the phorometer, or Maddox rod, will serve to detect a condition of

heterophoria. In a case of convergence insufficiency, we may find perfect orthophoria, or there may be some degree of exophoria, or even of *apparent esophoria*. An exophoria would not be surprising from the nature of the condition, an orthophoria would show, of course, the possibility of maintaining a parallelism of the visual axes, but what would be the significance of an *esophoria*, which would seemingly be entirely out of place in a case of weakness of convergence?

This occurrence of esophoria for distance in unmistakable cases of convergence insufficiency for near need throw no one off his guard. The esophoria is *apparent*, not *real*, the convergence insufficiency being the *key of the condition*. My colleague, Dr. H. B. Lemere, and I have explained this seemingly anomalous condition, as follows: In the constant effort to maintain sufficient convergence to avoid heteronymous diplopia for the near point, a partially spastic condition of the internal recti muscles is induced, which would account for this seeming esophoria for distance. We do not consider that this spurious esophoria should be a bar to efforts to increase the positive convergence in the condition under discussion. It is a result of the insufficiency of convergence, not a definite, real state of muscle imbalance. Consequently, in our efforts to correct the insufficiency of convergence in any case, whether by prism exercises or by operative procedures, we ignore such apparent esophoria, and find invariably that it disappears after the positive convergence has been brought up to the degree required.

This matter has been fully discussed by my colleague, Dr. H. B. Lemere, in a paper entitled, "Apparent Esophoria and Its Relation to Convergence Insufficiency", read before the section on Ophthalmology of the American Medical Association at the Minneapolis meeting in June, 1913, to which paper I beg leave to direct attention.

3. The determination of the *punctum proximum of convergence*.

It need not be expected that the power of convergence of the visual axes may be

determined with any degree of accuracy by the use of adductive prisms, with the test object at 20 feet. I am well aware that many ophthalmologists, whom we consider as authorities, have held that healthy eyes should show upon demand a prism convergence for distance of 30° , or 35° to 50° , and that persons who cannot do this have convergence weakness. I must disagree with this dictum. Healthy eyes after training with prisms may no doubt attain this degree of adduction, but not at the first office examination in advance of such training. In 1897 I conducted a series of experiments upon the subject of the dynamics of the ocular muscles, making use of 100 healthy young soldiers of the regular army, who were in perfect physical condition, and who had never had a symptom referable to their eyes. Only one of these healthy young men was able to exhibit a prism convergence of 26° , the highest degree reached, the average prism adduction being 14.1° .

My findings upon the physiologic action of the ocular muscles determined at that time were presented in a paper entitled, "A Contribution to the Study of the Dynamics of the Ocular Muscles", and published in the *Annals of Ophthalmology*, January, 1898.

Among my conclusions formulated in this paper, was the following: "That the determination of the punctum proximum of convergence, and the calculation of the maximum convergence, after the method of Landolt, are the only true tests of the real power of convergence, or the positive convergence". My findings were afterwards confirmed by Flavel B. Tiffany of Kansas City, who repeated my experiments, by Lucien Howe of Buffalo, and by Hansell and Reber of Philadelphia, as can be seen by consulting the published works of these observers.

I have never changed my views since the publication of the paper referred to.

The determination of the punctum proximum of convergence is very simple, and requires no more complicated apparatus than the well known dot and line on a card, and a rule to measure the distance from the corneae, at which double vision

results when the card is made to approach the eyes. Of course, in such a meeting as this, I need not explain further than to state what every oculist knows, that this distance from the corneae when divided into 100 cm. where expressed in centimetres, or into 40 inches when recorded in inches, will give the power of convergence in *metre angles*.

Now we come to a very practical question; how much convergence should a given individual have in order that near vision may be maintained with comfort?

Schuurman and Duane hold that the normal individual should see an object (as the dot) singly up to $2\frac{1}{8}$ inches from the corneae, which would be equivalent to a maximum convergence of 18.8 metre angles. Landolt, in his great work, "The Refraction and Accommodation of the Eye", places the necessary maximum of convergence at 9.5 metre angles. I am of the opinion that the exigencies and serious demand upon the eyes of our strenuous American life, require a higher degree of convergence than that given by Landolt, while a lesser amount than the 18.8 metre angles advised by Schuurman and Duane would seem to be sufficient. In my experience 13 metre angles of positive convergence will furnish sufficient power of convergence to secure thoroughly comfortable use of the eyes in near work, and I have made this the standard in my practice. This would mean, of course, that the patient should see the test object singly at three inches from the eyes.

4. *The determination of the punctum remotum of convergence, or the negative convergence.*

After determining the maximum of convergence in a given case, and finding it so defective as to constitute a convergence insufficiency, the negative convergence, or power of abduction should be enquired into in order that the examiner may form an estimate of what part a possible over-action of the external recti muscles may be playing. Abductive prisms furnish a ready means for determining this point. All oculists know from experience that prism abduction unlike prism adduction, remains quite constant in healthy eyes, and cannot be

appreciably increased by exercises with adductive prisms.

In my published experiments, the average prism abduction for distance in my 100 cases was 6.88° , or 7° virtually. The standard of 7° for healthy abduction has been generally accepted by the profession. To find the negative convergence in metre angles, divide the prism abduction by 7 as it is well known that 1 metre angle corresponds to 7° (prism).

If in a case of positive convergence much below the standard the negative convergence (abduction) should amount to 2 or 3 metre angles, one may suspect an over-action of the external recti muscles as complicating the case.

TREATMENT: (a) Any existing ametropia must be accurately corrected by lenses, and the patient be required to wear his correction constantly as an essential to success. In myopic conditions, showing moderate degrees of convergence insufficiency, this may relieve the trouble, but in marked degrees of the affection under discussion, whether in myopic or hypermetropic states, other treatment will be required as a rule. I consider prisms, bases in, combined with the ametropic correction contraindicated, and have not prescribed them for many years. The reasons for this are obvious.

(b) Training with adductive prisms and other exercises. Systematic training with adductive prisms of gradually increasing strengths, after the method of Gould of Philadelphia, may prove efficient in moderate types of convergence insufficiency.

The methods of training the adduction advocated by Worth are also highly beneficial as adjuvants in certain cases. Worth's amblyoscope I have at times found of service as a means of stimulating the fusion impulse and thus improving the innervation of the adductive muscles.

These methods may be satisfactory in instances where the maximum of convergence does not fall below $6\frac{1}{2}$ metre angles.

(c) Treatment by operative methods.

Where the maximum of convergence is decidedly low, say about 5 or 6 metre angles, especially if the negative convergence is comparatively high, operation

will be indicated in the presence of marked nervous symptoms. Under such conditions, operation should be undertaken even if there should be an apparent esophoria.

I am a firm believer in the value of the views of Landolt, enunciated many years ago, that in cases of insufficiency of convergence requiring operation, our operative methods should primarily be of the nature of an advancement of the internal rectus rather than a tenotomy of the antagonist. It will rarely be the case that a tenotomy of the antagonist will be advisable, and then only when the negative convergence is markedly increased. Some form of advancement being determined upon in a given case, what should be our method of procedure? I am an ardent advocate of securing the effects of an advancement by *shortening* the tendon by the use of a *tuck*. I have been performing this operation since 1898, and have never made use of the technical advancement operation for this purpose. The tuck operation was suggested by Dr. Savage in 1893.

The "tuck operation" which in my hands has proved eminently satisfactory, is the operation brought forward by Dr. Francis Valk of New York in 1897, with certain modifications. In this operation, the tuck is made with a single mattress suture of "0" or "00" chromicized catgut, and left buried, the flap of Tenon's capsule and conjunctiva being united over it by silk sutures, two generally being sufficient.

In performing this operation, I have found attention to the following points essential, viz.: (a) The careful freeing of the tendon from Tenon's capsule, and separation of the belly of the muscle from the globe back to a point beyond the base of the mattress suture, in order that the tendon may be permitted to slide forward when the suture is drawn taut to make the "tuck".

(b) The passage of the ends of the suture thru the upper and lower thirds respectively of the attachment of the tendon to the sclerotic embracing the dense episcleral tissue just at the tendon insertion, and the securing of a strong hold upon the belly of the muscle at the situation of the base of the mattress

suture by weaving the suture in and out as it is passed through the muscle. These steps are necessary in order that the muscle included in the base of the suture may be brought sharply against the attachment to the sclerotic, and held there without slipping.

In my experience, in a great many cases, a tuck so placed has invariably held. These are modifications of the original operation suggested by practical experience at the operating table.

Another modification, which has been utilized by my colleague, Dr. H. B. Lemere, and myself, is the following, which we have found very useful: In case after drawing taut and tying the mattress suture, an insufficient effect has been obtained, an additional effect may be secured by rethreading the needle upon one end of the suture, which has been left uncut, and passing the needle farther back thru the belly of the muscle, and then tying to the other end of the suture left in situ. This makes a supplemental tuck, which, in our experience, has always held firmly. The "hump" in the muscle resulting from the tuck atrophies in a very short while, and the tendon remains shortened in proportion to the amount of the muscle embraced in the mattress suture. This method has decided advantages over the usual technical advancement with a separation of the muscle from its attachment to the globe, and with a reattachment by silk sutures at a point nearer the cornea, for in the first place there are no sutures to possibly cut thru the ocular tissues, with a resulting slipping back of the tendon and loss of effect; in the second, the effect can be more accurately gauged, and if not sufficient the accessory tuck can be utilized, and thirdly, since an absorbable material is used to make the tuck, there are no deep sutures to be removed afterwards.

This operation, performed on one eye with the proper amount of muscle incorporated in the tuck, will in the great majority of cases be all that will be required. In very rare instances, with a strongly over-acting external rectus, and a markedly increased negative convergence, the greatest effect to be secured by tucking one internal rectus may not be

sufficient. Then after a short interval of ten days or two weeks, a similar operation may be performed on the internal rectus of the other eye, and the full effect required be thus secured. In extreme cases it may be necessary to also perform a tenotomy of the antagonist, as before noted. Such cases as the latter are desperate, and the patients will gladly submit to additional operative measures in the hope of getting relief. Local anesthesia, except in the case of very young, nervous individuals, is, of course, indicated. In addition to the instillation of cocaine in the conjunctival sac, I make use of a subconjunctival injection of a 1% solution of novocain around the tendon and belly of the muscle.

Conclusions: The views advanced in this paper may be formulated in the following conclusions:

1. That convergence insufficiency of the type discussed in this paper is a definite pathologic entity.

2. That this state is due to lack of proper innervation of the adductor muscles, which innervation is under the control of a special cerebral center.

3. That the use of adductive prisms can not be relied upon to furnish an estimate of the power of convergence in any given case.

4. That the power of convergence must be determined by finding the punctum proximum of convergence, and estimating the maximum convergence in meter angles.

5. That the negative convergence should be determined by abductive prisms as furnishing an important indication of a possible over-action of the external recti muscles, the normal negative convergence being about 1 meter angle.

6. That the normal maximum of convergence may be placed at about 13 meter angles, and that any marked falling below this standard is positive evidence of the existence of convergence insufficiency.

7. That if the maximum of convergence does not fall below $6\frac{1}{2}$ meter angles, exercises with adductive prisms, and other exercises, to strengthen the adduction may affect a cure of the convergence insufficiency thru stimulation of the innervation.

8. That if the maximum of convergence is as low as 5 meter angles, operation will be necessary as a rule.

9. That the existence of an apparent esophoria, in the presence of a definite convergence insufficiency, is no bar to efforts to correct the latter either by exercises or by operation, as the conver-

gence insufficiency is the key of the condition.

10. That operative measures should be of the nature of an advancement, or shortening of the internal rectus muscle, rather than a tenotomy of the antagonist, the latter expedient being reserved for rare and very extreme cases.

PRELIMINARY REPORT ON SUBCONJUNCTIVAL CATARACT OPERATIONS.

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Becoming interested in the operative method described by Husain of India, the author has taken it up and here reports the technic of his method of operating and the results obtain in 17 cases by himself and colleagues. Read before the Ophthalmologic Section of the Maine Medical Society, Nov. 14, 1919.

In December, 1918 the writer received from Dr. Tasadduk Husain, Ophthalmic Surgeon, Eye Hospital, Alahabad, India, a reprint describing an operation for cataract in which the section is wholly covered by conjunctiva after extraction is completed. Dr. Husain writes, "the chief advantage of this operation is the quick healing of the wound. Exogenous infection can occur only so long as the wound is unhealed and this period in this operation is so short, that the preliminary mechanical cleansing (done before the operation) the presence of collargol (dropped after the operation), the lower level, and the distant situation of the wound in the conjunctiva, are sufficient to prevent infection from traveling up a long way to the interior of the eye ball during the short time that the flap takes to adhere. In virtue of this quality, suppurations are reduced to 0.4 per cent in ordinary cases of cataract".

Dr. Husain recognizes Czermak's and Hari Shanker's work done in the same field, as follows: "My extraction is subconjunctival with a large conjunctival pocket-flap, so that I have taken advantage of the attempts of Czermak and Hari Shanker to produce quick healing of the wound. Thus, I do not claim to give you entirely a new operation, but my method of procedure is different from all these great operators on cataract. The modifications are novel and my own, and make the operation a distinctive one, and I

claim, that for a particular class of cases, it is the most suitable and rational procedure, and the only possible operation".

The instruments used by the writer were the usual ones with a keratome and thin, angled, blunt pointed iris scissors instead of a cataract knife, and some form of anterior chamber irrigator. The usual preparations were made, the operator being careful to flush the conjunctival surfaces thoroly with boric acid solution just before the operation. Cocain was used as usual.

A small opening was made in the conjunctiva, about one cm. above the sclerocorneal margin (the patient looking down) and this enlarged from each side horizontally to $1\frac{1}{2}$ cm. in length, keeping the line of incision equi-distant from the sclerocorneal margin. Thru this opening the subconjunctival tissue was cut to the limbus. Then, with the scissors closed and with lateral movements, pockets were made on each side of the central subconjunctival tunnel. At this point in the operation there may be considerable hemorrhage. Gentle sponging with tooth pick cottoned swabs will control this. The flap or lower margin of the incised conjunctiva was lifted with forceps and with the angular keratome a puncture was made into the anterior chamber at the sclerocorneal junction, care being taken not to injure the capsule. The point of puncture is easily seen if kept clean by one's assistant. It is well

to go in as far as possible with the keratome, making less cutting with the scissors necessary.

The conjunctival flap was still held with forceps in the left hand. Then thru the incision made by the keratome, one blunt blade of the scissors was passed into the anterior chamber, above and along the plane of the iris and the sclero-corneal junction cut, first on one side, then on the other side of the keratome wound, thus lengthening it to allow for the delivery of the lens. If the subconjunctival pockets on each side have been made large enough there will be no difficulty in passing the scissors. The writer has found artificial illumination almost imperative while using the keratome and scissors. Buckling is apt to

occur if the scissors are not very sharp and well made.

With the assistant holding the flap, iridectomy, capsulotomy and delivery may be performed without difficulty. If, before or after delivery, blood collects in the anterior chamber it should be at once washed out (the irrigator should always be at hand), as it coagulates very quickly. After delivery the writer has always irrigated in the effort to remove any transparent cortical present. Reposition of the coloboma was easily done with the flap held up and forward. The conjunctival flap was carefully smoothed back, approximating the cut edges as well as possible and one stitch taken centrally. This was removed on the third or fourth day.

TABLE OF CASES.

Case	Age	Admission Vision	In Hospital	Discharge Vision
1	74	V. O. D. light perception	10 days	V. O. D. 20/200 (capsule)
2	71	V. O. D. fingers at 6 feet	9 days	V. O. D. 20/40
	71	V. O. S. fingers at 1 foot	10 days	V. O. D. 20/40
3	65	V. O. D. light perception	9 days	V. O. D. 20/100 (capsule)
4	64	V. O. S. light perception	8 days	V. O. S. 20/200 capsule)
5	65	V. O. D. light perception	10 days	V. O. D. fingers at 2 feet (cortical)
6	52	V. O. D. light perception	11 days	V. O. D. 20/200 (capsule)
7	75	V. O. S. light perception	14 days	V. O. S. 20/70
8	60	V. O. S. 20/70	17 days	V. O. S. 20/30 (final test)
9	60	V. O. D. fingers at 8 feet	10 days	V. O. D. fingers at 1 foot (capsule)
10	69	V. O. D. fingers at 10 feet	10 days	V. O. D. 5/200 (capsule)
11	82	V. O. D. light perception	5 days	V. O. D. 20/30 (final test)
12	80	V. O. D. 20/70	6 days	V. O. D. 20/30 (final test)
13	73	V. O. S. light perception	14 days	V. O. S. 20/200 23 days later V. O. S. 20/30
14	59	V. O. S. 20/100	6 days	V. O. S. 20/70 3 weeks later V. O. S. 20/30
15	35	V. O. S. 10/200	8 days	V. O. S. 20/30 (final test)
16	66	V. O. S. 4/200	8 days	V. O. S. 20/30 (final test)
17	74	V. O. S. 10/200	21 days	V. O. S. 20/100

A drop of atropin and some good ointment, like White's, was used in the eye and a double bandage. After six or eight hours the bandage was removed from the unoperated eye, leaving the operated eye bandaged. The writer feels that many cases of dementia may be obviated by giving the patient one eye.

In the subconjunctival operation for cataract there is no danger of the wound opening a few hours after operation. Husain found that the average time of patients in the hospital was 4.84 days. The writer found about six days hospital care necessary.

The conjunctiva remains injected for several weeks after the operation, but does no harm otherwise. Striped keratitis is more often present, but the writer has not seen it persist.

One of the writer's confreres reported late hemorrhage into the anterior chamber, which absorbed without doing any harm, and in two cases there was delayed healing of the sclerocorneal wound with ballooning of the conjunctiva like the bleb after Elliot's trephining operation. This flattened out without doing any harm.

It takes longer to do the operation, but the writer has no difficulty, nor have

his confreres. Husain reports no trouble but says that prolapse of the iris "fortunately of very rare occurrence" is difficult to deal with.

The writer did not attempt this subconjunctival method of extraction until the end of his spring hospital service. The results were so satisfactory that he persuaded several of his confreres to try this method of extraction.

Many of the cases listed in the following table are to return for secondary operations but the private cases are completed.

It has always seemed to the writer that this danger of infection could be minimized by some sort of conjunctival flap, which would entirely cover the wound. The usual flap with the knife leaves the extremities of the incision exposed. The bridge operation leaves one end somewhat exposed and the bridge is awkward to manipulate. In this operation the danger of infection and the attending worry are almost dissipated.

In conclusion the writer wishes to thank his confreres Dr. Standish, Dr. Greenwood and Dr. Ellis, for their courtesy in allowing him to report their results, with his, in this operation.

PROPER TIME FOR OPERATION ON CONGENITAL CATARACT.

M. HAYWARD POST, JR., M.D.,

ST. LOUIS, MO.

The report of a case of this character is the occasion for a discussion of the proper time for operating; and early operation is urged, preferably about the eighth year.

The question whether congenital cataract should be operated on early in life, say roughly before the tenth year, presented itself forcibly to my consideration for the first time about four years ago. On the third of April, 1915, Miss D. came to my office for an opinion as to the advisability of an operation for the removal of bilateral congenital cataract. Thirteen years before she had been seen by Dr. Post, Sr., at which time she was ten years of age. The record shows, and her statement bore out the fact, that by holding books close to her right eye she was

able to read. The note stated that with correction O. D. V 3/30 O. S. V 3/150 and Jager No. 10, with difficulty. For some reason unknown, the operation was postponed for a short time.

The patient regretted that she was late in returning, but reported that she had been able to do sufficient work to go thru the freshman year in the State University with her eyes in their present condition.

The questions now arose: first, was it too late to operate and find the retina in good condition; second, if degeneration were present was it possible that

it could have been avoided by earlier operation; and thirdly, had Dr. Post deferred operation because he did not believe that even at that time it was justified and did not wish to discourage the patient by a statement to that effect, as was so often his way? With these questions unanswered but feeling that there was nothing to be lost by operation on the left eye, which was the poorer one, the patient greatly desiring it, and the cataract slowly enlarging, operation was advised on that eye.

On April twenty-third, with a very sharp sickle needle the lens was incised by a single horizontal incision about two and a half millimeters long. The capsule was very tough so that there was some difficulty in the operation.

The case progressed quietly and without complications. On September third, four and a half months after the operation, the pupil was clearing from above and to the temporal side, and with 7.00 D. sph., a good view of the disc was obtained thru this region. On December second, seven months after the operation, there was a good clear central pupil thru which the fundus could be well seen with 8.00 D. sph. No abnormalities were noted. At this time the ophthalmometer showed an astigmatism of 2.00 D. vert. Mer. Vision seemed, however, to be eccentric and patient could not read even large print. The last observation taken in May, 1916, shows no further improvement and a partial central scotoma which probably accounts for the extremely unsatisfactory result.

Until the time of the last examination the patient was very anxious to have the second eye operated upon. But, in view of the result of the first operation, is an operation on the right eye justifiable? What harm, if any, would result from waiting perhaps three years to see whether or not the left eye improved?

My interest was naturally greatly aroused and I began to review the literature as to the result of late operation on such cases and to compare them with those of earlier operation.

It was surprising to find how little interest the question had aroused, at least to judge by the small amount of literature dealing with it. There is very great diversity of opinion, but as a general rule the majority of writers hold that the dangers from amblyopia ex anopsia are greater in proportion to the amount of lens involved and the consequent impairment of the function of the retina. In the case of diffuse cataract all agree that early operation is imperative, but the opinion is not so unanimous with regard to those of lesser degree.

The other argument in favor of early operation is that complete absorption of the lens substance and capsule is much more likely and rapid in young cases and that more radical measures, such as linear extraction, are less likely to be necessary either because of the production of glaucoma or failure of the lens and capsule to absorb.

Fuchs demands operation during the first year of life. He says, "Cataracts which are congenital or develop in childhood should be operated on as early as possible at the age of a few weeks. If the cataract is not operated on the development of the retina is arrested and amblyopia ex anopsia is produced."

On the other hand, Grod, reporting on the statistics of cases operated on by Hess and Hirschel at Würzburg during fifteen years, shows that early operation causes an arrest of growth of the eye and that useful vision is obtained in a higher percentage of the cases operated on later than in those of earlier years. In summary he expressed himself in favor of a late rather than an early operation.

J. E. Brown reporting on sixty-six cases in the Ohio State School for the Blind does not gather that the age of the patient at the time of operation influences the final result, his cases ranging from childhood up to middle life.

No opinion could be found expressed in the American Encyclopedia of Ophthalmology, so far as published, on the question as to the relation of age to the final result. But as a plea for early

operation, I should like to quote the following from its pages:

"Discission in any of its simple forms is the safest if the most lengthy procedure for the treatment of all states of juvenile cataract before, say the age of ten. When the patient is older, say from ten to thirty, discission alone or combined with suction or the removal of the discission masses thru a corneal opening may be done in cases where there is no reason to suspect a hard nucleus." Still later, say after thirty years of age, any of the operations for the extraction of cataract may be done."

Henry R. Swanzy says, "Treatment is more satisfactory if undertaken early in life by discission and absorption than if later in life when extraction must be resorted to." Discission he further states, is applicable to all complete cataracts up to the twenty-fifth year of age.

That amblyopia ex anopsia may develop from congenital corneal opacities, and congenital cataract is the statement of de Schweinitz in his text book of ophthalmology. Fuchs is in agreement with de Schweinitz in this regard. He further says, "Treatment consists in the earliest possible removal of the obstacle to vision. This will hold good particularly for the cataract of childhood, the performance of which was formerly as a matter of choice put off until the age of puberty, altho we may operate upon cataract (by discission) in childhood even at the age of a few months with the best results." And further, "Exercising of the amblyopic eye is of service in bringing up the functional power of the retina."

With the exception of the report from the Würzburg clinic and Brown in Ohio, these reports all indicate that early operation is advisable in congenital cataract, and that the penalty of too lengthy postponement is degeneration of the retina with loss of function, but that this function may in part be restored by exercise and in this way the disadvantages of late operation may be partially overcome.

The case which I have above related from my own experience would stand

in support of this view. It is only an isolated case and as such of little value except as illustrating the fact that such inactivity may result in complete or partial loss of function.

Two further arguments for early operation, one illustrated by the subsequent history of the case here presented should be taken into consideration. I have been forcibly impressed with the fact that the mental anxiety developed by the patient waiting thru the number of years during adolescence, thinking and reasoning and often studying over her chances of success in an operation that is to mean so much for her whole future, influences the prognosis very much to its detriment. The child of ten does not worry and brood over the situation, she is not so introspective nor does she realize her condition. She puts all her trust into the hands of her parents and lets them do the worrying, which does not materially interfere with a successful outcome. But the young man or woman of twenty years of age has frequently gotten hold of medical or semimedical literature and made a considerable study of the subject and if at all neurotic has greatly magnified the dangers and finally come to the operation as to a great and desperate gamble with their entire future at stake. Their nerves may stand the strain of the actual procedure but the break-down all too frequently follows. The patient under discussion was operated upon for the right cataract two years after the first at her own earnest solicitation with the result that following the operation she became hysterical and unmanageable. Three weeks later while the eye was slowly clearing up, still remaining somewhat irritated, it was thought that returning to her home in the country to be watched by the family physician might improve her mental condition. But within a few weeks' time she returned to the city with a well developed glaucoma which no measures were able to relieve, and the vision of the eye was lost.

The second additional consideration is the mental development of the patient. These cases are not infrequently

rather abnormal children in other respects and should be given as much help as possible during the formative period. The general improvement, both physical and mental, in children where the operation has been resorted to about the tenth year in life has been truly remarkable. A case which I have at present under my care illustrates this point. The first operation was done upon the left eye about three years ago at the age of ten, at which time the patient was very inferior mentally, with about the development of a child of three. Since then she has been enabled, for the first time, to at-

tend school and will take her place in the near future with normal children to grow up as one of them. A consideration not to be overlooked.

Therefore, in conclusion I believe that operation should be undertaken as early as practicable after the eyes have had the greater part of their growth, preferably about the eighth year, in order to lessen the possibility of retinal deterioration, to facilitate the operative procedure, to reduce to a minimum the danger due to anxiety neurosis, and to assist the child to grow up under as nearly normal conditions as possible.

ADVENTITIOUS HYALOID MEMBRANE FOLLOWING OPERATION FOR SECONDARY CATARACT.

S. LEWIS ZIEGLER, M.D.,

PHILADELPHIA.

After cataract extraction vision may remain impaired out of proportion to the pupillary membrane, and in spite of operation. This paper gives an explanation of such cases, and reports one as an illustration. Read before the Section of Ophthalmology of the A. M. A., June, 1919.

In my monograph on the "History of Iridotomy" presented before this section at Chicago, in 1908, I called attention to my method of V-shaped incision as practiced in two classes of cases, (1) those with heavy iritic membrane and (2) those of more delicate secondary capsular cataract. Today I wish to call attention to an almost intangible filmlike membrane that may form over the vitreous surface after either of the operations named for secondary cataract and which requires similar treatment. This condition I have chosen to designate as "adventitious hyaloid membrane."

SYMPTOMATOLOGY

The symptoms are both objective and subjective. Objectively, oblique illumination shows a *faint iridescent sheen* covering the whole surface of the vitreous body as exposed in the artificial pupil, while direct illumination reveals perfect and permanent transparency of the cornea and vitreous media.

The patient's subjective symptoms are usually those of a distant vision of

from 20/30 to 20/50, but a reduced reading vision of from J-6 to J-12. The patient, therefore, grumbles because his good street vision is not accompanied by a correspondingly good reading vision, while the physician either blames a poor adjustment of glasses or charges stupidity on the part of the patient. This condition may appear in a week or two following the secondary operation, or may not occur until several years later, when the patient notices a sudden reduction in the ability to read, while the oculist finds it impossible to improve the near vision by refraction.

ETIOLOGY

While no definite pathogenesis can be demonstrated in these cases, it is nevertheless my belief that the mildly corrosive action of a chemically perverted aqueous secretion is responsible for the formation of this filmy opalescent membrane. There is seldom any evidence of inflammatory reaction, altho in one or two cases I have noted the presence of slight ciliary con-

gestion. As a rule, however, there has been an entire absence of disturbing factors, which fact has made the visual diminution the more disappointing. In the single case cited herewith there had been a history of iritis with plastic deposit on the lens capsule some twenty-five years before, and the possibility of some absorption of irritating lymph secretion from a marked acneous eruption on the nose. This, however, is a complication that is most unusual.

TREATMENT

There is only one thing to do in these cases, and that is to operate by the method of V-shaped capsulotomy, which should be performed *pro forma* by going thru all the manipulations in a classical way just as tho a heavy capsule were present. If one maintains a good oblique illumination of short focus one will note a wrinkling of the membrane as it presses before the knife, which will be pleasing to the operator because it will demonstrate to him that he has a real pathologic entity to deal with. One will often be surprised at the end of a week to ascertain by refraction that altho the distant vision has improved but slightly, the corrected near vision will now register J-1.

REPORT OF CASE

HISTORY. Capt. T. F. I., aged 56, of Summerville, S. C., consulted me, Nov. 12, 1918, suffering from occlusion of the pupil in the right eye following cataract extraction performed in Charleston, Sept. 23, 1918. The eye was still red and irritable as a result of an infection which occurred two days after operation, and cleared slowly, leaving the pupil occluded and drawn upward. The tension appeared to be slightly below normal. I advised plus galvanism to drive out the congestion and prepare the eye for operation, which result was secured in about ten days.

The patient had suffered from an attack of iritis in both eyes twenty-five years before, which left capsular deposits in the pupils of both eyes. The pupil of the left eye showed seclusio

pupillae, with the lens more or less opaque in the exposed area. The tension was normal and iris color the same. The vision was: right eye, 1/200; left eye, 3/200. There was present lacrimal obstruction in both eyes and a marked acneous eruption covering the nasal epidermis.

November 22, I performed a V-shaped iridotomy with my knife-needle, entering the anterior chamber above and making two free incisions in the iridocapsular membrane, from below upward. The first iritic puncture caused pain, the second did not. There was slight hemorrhage from a patch of plastic deposit at the edge of the old pupil, which was uncovered by the second incision, but this was quickly absorbed. There was a slight escape of semifluid vitreous at the point of incision, which exhibited some turbidity. I was able to obtain a nice, open pupil, somewhat triangular in form, with the base located downward. The blood quickly cleared away. At the end of two weeks the refraction in the right eye was $S + 11.D \subset C + 1.D$ Ax $110^\circ = 20/70$, and $S + 4.D$ added gave J-8, which subsequently became reduced to J-12.

December 19, I showed the result before the Section on Ophthalmology of the College of Physicians of Philadelphia with the comment that "the slight iridescent reflex in the pupillary area of the right eye may indicate the formation of an adventitious hyaloid membrane and may call for further operative interference." December 28, this appearance had become so pronounced that a V-shaped incision was made in this membrane, which gave a distinct sense of yielding as the incision opened up. No reaction followed, and at the end of one week the refraction proved to be the same as before, but vision was now markedly improved, the distant vision with the same glass being 20/30 pt. and J-1 for near.

CONCLUSION

Adventitious hyaloid membrane, altho of rare occurrence, is a distinct patho-

logic entity. During an experience of more than thirty years, I have observed only seven or eight cases, altho others may have been overlooked by me in the hasty routine of practice. The cardinal symptoms as stated are (1) lowered visual acuity for near when the distant vision is good, and (2) the presence of an iridescent vitreous reflex as revealed by oblique illumination. Altho it occurs

as a sequel of an operation for secondary capsular cataract, its presence demands a *pro forma* repetition of the V-shaped incision in order to divide the film and restore normal vision. A cursory glance at the literature reveals nothing of importance concerning this condition, and I have concluded, therefore, that the subject might stimulate thoughtful discussion and the reporting of similar cases.

COMPLICATIONS IN THE INTRACAPSULAR EXTRACTION OF CATARACT.

JOSEPH E. STERNBERG,

BOSTON.

From a personal experience with this method of operation this series of observations is drawn. It takes up the different steps of the procedure one by one and gives its authors' conclusions.

Within recent years, much has been published in ophthalmic journals, relative to the advantages of removing cataract in its capsule. Papers have been read and discussed, but in very few of them have I been able to find reports dealing with postoperative developments, and the lessons learned therefrom.

My personal experience with twenty-three cases of intracapsular extraction, finds me most enthusiastic over the Smith cataract operation. I have been a close follower of Dr. Fisher's suggestions and technic, with most gratifying visual end results, in spite of the long delays of some of my cases healing, the cause of which I will touch on later. The twenty-three cases from which these deductions are drawn were ideal ones, careful examinations being made as to histories, light projection, blood pressure, tension, teeth, urinalysis, and physical condition, ages varied from 58 to 82.

THE INCISION, as suggested by Col. Smith and recommended by most others, should end within the limbus, from 1 to 2 mm. In my first nine cases this method was closely followed with rather disappointing results, requiring from 10 days to two weeks for the wound to seal tightly. This fact tempted me to try a slight conjunctival

flap, with pleasing results. In the next five cases firm union was noticed at the end of the fourth day in two cases, on the fifth day in the third and in the remaining two, on the sixth day. Altho contrary to the prescribed routine, eyes were inspected daily after the third day, to study the healing progress.

THE IRIDECTOMY. This cannot be improved upon, as now practised by most operators in their own manner, some doing a preliminary, others doing it at the time of the extraction. I believe that unless the patient is extremely restless and nervous, the iridectomy should be done at the time of the extraction, working on the supposition that entering an eye twice increases the danger two-fold. No preliminary iridectomies were made in my cases.

EXTRACTION OF THE LENS. To insure easy delivery, it is absolutely essential to make a fairly large incision, almost half of the cornea to allow for a possible large lens. It is not only essential but of the utmost importance to have an assistant who thoroly understands holding the Fisher hooks. Of the cases cited, vitreous was lost in only one (the 22nd), this being due to the faulty manipulation of the hooks at the crucial moment; the case how-

ever showed perfect healing at the end of the seventh day, and it was one where a conjunctival flap was made.

TOILET. In no case do I flush an eye after the extraction. Assuming that our field of operation is as sterile as it can be made, why introduce uncertainties? If a little secretion does collect I absorb it with a moist piece of cotton or withdraw it with a medicine dropper.

Many operators advise trimming the eye lashes of the eye to be operated on. I do not consider this an essential feature, but believe it rather detrimental. By allowing them to remain, one has something to take hold of in helping close down the lid after the operation and in raising it for inspection of the eye.

I have found of great value the application of yellow oxid of mercury with atropin to the lids of the operated eye, immediately after the operation; and yellow oxid of mercury without the atropin over the lids of the unoperated one, my reason for this being, that some reaction will take place in the eye-ball and that enough atropin may find its way thru the fissure to check what might be a severe iritis.

Postoperative pain occurs in most cases. This, in connection with the fact that the patients are required to lie on their backs for the first twenty-four hours, is very distressing, and calls for a sedative or a hypnotic. I have had excellent results from the use of sodium bromid in doses of twenty to thirty grains, given an hour or so after the operation. It answers a two-fold purpose, it is conducive to a good night's rest and relieves the nervous tension.

Since adopting the conjunctival flap, I have made it routine practice not to open the operated eye until the seventh day, altho the dressing is changed on the third day. This being done in a darkened room without inspecting the wound. The unoperated eye is left uncovered at this time, and smoke glasses No. 4 shade provided.

Many operators claim that iritis

does not occur as an after complication, this claim the writer can not substantiate, as almost all my cases showed some iritic symptoms, pain, circumcorneal injection, pain which was worst during the night and involvement of the ciliary vessels. These cases responded readily to the use of atropin and cleared in a few days. What produces the iritis? If all has gone well the question is a most interesting one. I am inclined to believe that the hyaloid membrane is the cause of this, due to its coming in contact with the injured iris, producing a mechanical irritation.

Recently I have made use of Dr. Jackson's cataract knife, the blade of which is about 5 mm. wide, rather than the one suggested by other operators and am very much pleased with it. The fact of its width gives a greater cutting surface with one thrust, eliminating the possible entanglement of the iris; and I suggest it be tried out.

CONCLUSIONS.

The section with a slight conjunctival flap is more efficacious than the corneal one, and healing is more rapid. This results, chiefly from the blood vessels in the flap supplying nourishment to the wound, while the cornea has to depend on its lymph supply.

Make all sections large enough to insure the delivery of a possible large lens, and no complications will result.

Of paramount importance is the proper manipulation of the Fisher hooks by an assistant who knows how.

If all has gone well, do not inspect the operated eye for a week. You will be happily surprised with the healing progress, if you have used the flap method.

A preliminary iridectomy is not essential, furthermore it may be a source of danger.

Iritis does occur and calls for the use of atropin.

The use of the ointments as suggested will be found most practical.

Flushing the eye after the extraction is uncalled for, and should be dispensed with.

NOTES, CASES AND INSTRUMENTS

IMMEDIATE CAPSULOTOMY DURING CATARACT EX- TRACTION.

DR. FRANCISCO M. FERNANDEZ,
HAVANA, CUBA.

The paper with a similar title, by Dr. Bennett (A. J. O. v. 2, p. 854), has very correctly brought to light the importance of employing as few instruments as possible in the operation for cataract, and altho Dr. Bennett wisely believes that the old Trousseau method could be somewhat amplified as to use some more instruments to avoid the unnecessary risks that a too crude technic may produce, we think that with a good assistant, the Trousseau method is quite a safe procedure.

The writer has been a partner of Dr. J. Santos Fernandez, the true old man of Spanish ophthalmology, for almost twelve years, and has assisted him in several hundred operations for cataract. The writer himself has been fortunate enough to have performed 600 operations for senile cataract and in more than 70 per cent of all of them the instruments employed have been only the cataract knife and the fixation forceps, when operating by the simple extraction method.

The Trousseau method, also employed by the old Spanish ophthalmologist, the late Dr. Cervera, should undoubtedly be considered as the preferred method, as regards the very slight chances of infection and the few seconds employed in the whole operation. A wider use of that procedure would surely gain for it many adepts. We heartily endorse Dr. Bennett's opinion of it.

The technic employed is simple. After the usual aseptic routine, the patient being ready for operation, the assistant holds with the thumbs of both hands, the lids of the patient, avoiding thus the use of blepharostat or lid holder. The surgeon grasps the conjunctiva over the tendon of the external rectus with the fixation forceps and

makes the puncture in the corneal border slightly above the line of the equator, and with the point of the same knife makes the capsulotomy, with a single stroke, carrying then the knife upwards and outwards, bringing it out on the other side; and finishes the incision after leaving a wide conjunctival flap.

We do not habitually use atropin to dilate the pupil previously to the operation; but have done so in many cases and find it a good procedure.

As we can not classify for the expert class that Dr. Bennett jocularly mentions, we have not qualified for the operation revived by Smith of India and simply side ourselves with Dr. Bennett, believing that the great rank and file of ophthalmologists, not being able to rank in the expert class, could really obtain good results with the simple method described, especially when a very wide conjunctival flap is dissected.

DIONIN FOR WOOD ALCOHOL POISONING.

RALPH A. FENTON, A.B., M.D.,
PORTLAND, OREGON.

The following case, originally reported in *Northwest Medicine*, gains interest and importance from the notes of its condition after more than two months from the ingestion of the poison.

A young professional man obtained about four ounces of what he considered grain alcohol from a stock bottle in a drug store, pouring it out himself. Analysis had disclosed the fact that he had taken denatured alcohol by mistake, comprising 90 per cent ethyl alcohol, 10 per cent methyl alcohol, and perhaps half a grain of corrosive sublimate to the ounce.

He consumed almost all of it, mixed with ginger ale, during the afternoon and evening of New Year's day. No discomfort was noticed until he awoke next day with vision down to the perception of large objects, polyuria and other

characteristic wood alcohol symptoms. He resorted to free saline purges, diuretics, and took much acid in the shape of fruit juices and sour foods.

When examined four days later he presented the usual dilated pupils, without reaction for light or accommodation, vision reduced to 2/200, loss of red and green perception, and a large central blind spot in each eye. The retinas were very edematous above, below and toward the macula from the optic disc. There was a deep-seated ache behind both eyes.

A solution of dionin, 5 per cent, was instilled into each eye, with the usual reaction of smarting and swelling of the conjunctiva. The aching previously complained of was much less in an hour's time. Free use of sodium bicarbonat by mouth was advised,

and he was sent home to use the dionin daily for three days.

On his return vision was 20/20 right, 20/15 left; he reported awakening the morning following the first use of dionin, seeing all objects fairly clearly, but tinged with red. In an hour's time they had turned green, and by afternoon had resumed normal colors. He continued to use the dionin three times a week.

March 5, two months after ingestion of the poison, this individual again presents himself, with dilation of the pupils, vision both eyes 20/20, fields slightly contracted, and both nerve heads distinctly pale. The retinal edema has gone. He has become slightly nyctalopic and finds considerable trouble in driving along white roads in the bright sunshine. This is relieved somewhat by tinted lenses.

SOCIETY PROCEEDINGS

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

OPHTHALMIC TRANSACTIONS

Cleveland, Ohio, October 16-18, 1919

President, DR. J. M. INGERSOLL.

The Academy in the Recent World War.

DR. ALLEN GREENWOOD of Boston read a paper describing participation of the Fellows of the Academy in military service to which was appended a list of these members and their activities. **Department of Head Surgery in Army.**

DR. WALTER R. PARKER, Detroit, Michigan, said: When we first started, and after several months, there was not a specialist in any general hospital. Before the war ended every general hospital in the United States, at the request of the general officer, had an eye, ear, nose and throat man on its staff. It is felt there is room in the wards of the modern hospital for these men. If I were consulted on the special work again I would recommend that the brain and peripheral nerve work be

kept in general hospitals. But I believe the plastic work on the face is so particular it should be a specialty. I think the best way to get a personnel would be to have a modified "Oglethorpe". This would give us a list of men who are willing to go, and they would be organized and have a personal examination and intensive training. The list in the surgeon general's office would show when each is qualified to do the work.

Industrial Conservation of Vision.

DR. E. M. SHANKLIN, Hammond, Ind., read a paper on this subject. The attention of manufacturers, particularly those engaged in the iron and steel industries, has recently been drawn to the necessity of guarding employees against eye injuries. Coincident with the action of the various national and state societies in appointing committees on conservation of vision, various manufacturers began the study of the problem—first by the appointment of safety committees and later by establishing casualty departments. The latter method was prolific of immediate

and astonishing results, as is evidenced by an immediate reduction of 80% in eye injuries in one plant. Goggles at once became a necessary part of the equipment of all employees, in those departments furnishing the greatest number of eye cases. One casualty manager reported but three eyes lost in twenty-seven months in the nine plants of his company; and in but one of these cases did the employee wear his goggles.

Exposure to strong light and heat are guarded against by various combinations of colored lenses and thus another common cause of injury is controlled. The organization of Industrial Boards in various states has added to the work of the casualty managers in no small degree. Employees no longer wait months or years to receive payment for injury, nor do they have to prove negligence. Malingerers were very frequently before the boards in the early days of compensation law and are not yet uncommon. The necessity of sending eye cases to trained oculists is rapidly becoming apparent to casualty managers, and particularly to the liability companies, as is the importance of physical examination of employees. The dangers of permitting "store room experts" and other untrained men to treat cases of eye injury are being recognized.

DISCUSSION.—Dr. V. A. Chapman, Milwaukee, hoped for information concerning occupational diseases of the eyes, particularly those which occur in workers in chemicals, in connection with the munition factories and other plants of like character. Standardized protectors have recently been proposed by the Bureau of Standards of the U. S. Government. He would like to hear about them.

He would speak of the negligence by employers of labor, regarding the vision of the employee with respect to the work that the employee is placed to do. They go to great expense in getting an efficiency expert to plan their factory buildings; to lay out the floor plans as to the placing of their machinery so that it will work to the best advantage; and they have paid

attention to the proper lighting of the factory rooms. They realize the necessity of this for the promotion of the greatest output efficiency. Yet they hire workmen to operate machines without regard to the workman's visual acuity; which has much to do with his capacity, and their ability to get the highest efficiency from the plant.

He pointed out some years ago, the necessity of examining the eyes of prospective employees before they are taken into employment. The wisdom of this has been demonstrated many times. Some time a bureau will be established which will provide accurate information, from records, to employers of labor, and Industrial Commissions concerning the physical condition of workmen. A clearing house, by which the employer will receive protection in case of industrial accidents, and will be able to place the man at proper work, to the mutual advantage of the employer and employee. This would lessen the danger which an employee of low vision works under at certain employments. It would enable the Industrial Commission to render a just verdict as to the compensation the workman is entitled to after he has received an injury. It would enable an employer to place his employees at such work as their vision enables them to do with the greatest efficiency.

A man employed on a structural steel building a hundred feet from the ground, had vision in one eye of less than 20/300. While at work a piece of steel flew into his good eye. The man was helpless. He had sense enough to cling to a steel beam with his eyes shut until help reached him, otherwise he would have fallen to his death. That man belonged on the ground.

A knitting factory installed a machine to do fine knitting, formerly done by hand. A few weeks later the manager asked for help concerning this machine. It required close watching during its operation. Some seven or eight girls had refused to work on it after a few days, because it gave them severe headaches and they could not stand the work. They sent to my office one of the girls, who liked the work and

wanted to continue it; but simply could not do it on account of the eye strain. We found she had considerable refractive error and some heterophoria. After a short course of treatment and the proper correction of refractive errors, the girl has been operating this machine for months; with the greatest satisfaction to herself and her employers. This matter is worthy of deepest consideration in the industrial conservation of vision.

Dr. G. H. Mundt, Chicago: The man who has a severe injury to his globe will get into competent hands. The man who has a foreign body in the cornea would probably receive the attention of a fellow employee. Until the union is educated that it is not safe for the man, for the employer or the general public that he be employed, you cannot be as careful in employing a man as you should be.

Dr. F. Park Lewis, Buffalo: There are two topics involved in this paper of Dr. Shanklin's. The first is the care of injuries of the eye, and the men understand this. But the preventing of injuries is a sociologic topic, and it is not one we can reach without the cooperation of physicians with those employing labor, those having to do with the question of rates, and of others. Last year a survey was made of a number of industrial institutions in Buffalo and an investigation made as to preventive measures. That reaches one community. There are hundreds of communities in which this has not been done. The only way it can be made effective is by an organized, cooperative movement. It is essential there shall be groups of men who feel some such methods as those used in the National Association for the Conservation of Vision can appeal to the employee, the employer and the doctors. The unions do not want preliminary examinations. But when the employer, the illuminating engineer, and all others who would be interested in work of this kind get together, it is hoped to have an organized movement by which we can limit the injuries to the eye.

Dr. Nelson M. Black, Milwaukee:

The National Safety Code for the Protection of the Eyes divides the various processes in which it is necessary that the operator be given protection for the head or eyes, or both, into nine groups, each one of which requires a protector of a particular type. The examples given under each group are only illustrative. The groups are as follows:

Type A. Protection from relatively large flying objects; as chipping, caulking, and riveting.

Type B. Protection from flying metal; as babbitting, pouring of lead joints, pouring hot metal and dipping in galvanized tanks.

Type C. Protection from dust, and light flying particles; as in scaling, grinding, stone dressing and wood working.

Type D. Protection from gases, fumes and liquids; as in handling of acids and caustics, nitrous fumes, dipping in galvanizing tanks, japanning.

Type E. Protection from excessive dust and light flying particles; as in sand blasting.

Type F. To intercept injurious radiant energy to a moderate degree.

Type G. To intercept injurious radiant energy, and a large part of the visible radiant energy; as in electric arc welding and cutting.

Type H. Protection from dust and wind; as in truck driving.

Type I. Protection from reflected light or glare; as long exposure to snow-covered highways, glare from lights, exposure to reflected sunlight, from roofs, road beds, etc.

Dr. A. C. Bennett, Buffalo, N. Y.: In the early part of the war, in five weeks I had seven cases seriously injured from breaking goggles. They should be properly made. In two cases the cornea was divided across, and in one case the sclera was perforated. In one case the eye had to be removed.

At present the commissioners give us the vision on the 20/20 standard, a man with a vision of only 20/40 gets the full compensation for the loss of vision. He has lost some vision, but it does not seem right that the loss of one-half his central vision, should go

for the loss of that eye. The loss of vision is not simply the loss of central sight.

Dr. Shanklin, closing: Several have mentioned the employees or unions being opposed to physical examination. If you have read the demands made by the steel strikers now out, you will remember that the last clause is as follows: "There shall be no physical examination of employees."

In the Calumet region, the iron and steel industries are waking up to the fact that they have to have physical examination of their employees. We have one of our railroads that has no physical examination of employees whatever. One of the employees had quite an injury to one of his eyes. I discharged him, and later on in conversation I said I would not make a final examination and certify him for work until he called again. He said that was not necessary, it was not required on his road. If they can see a box car ten feet away that is all that is required on this trunk line. The manager told me the other day they are working on a plan now whereby they will have the employees examined.

In this matter of compensation, I am not ready to adopt any of the percentage charts that have been adopted. I like Dr. Chapman's chart better than any I have seen, but I am not ready to accept that.

Hysteric Amblyopia.

DR. FREDERICK TEAL, Lincoln, Neb. read a paper discussing the causes of this condition and its chief characteristics, especially the disturbances of the visual fields and color senses. He referred to the difficulty of distinguishing between malingering and hysteria, and reported cases showing the difficulty of diagnosis.

DISCUSSION. Dr. J. M. Banister, Omaha: Our English confreres devote a good deal of attention to psychic injuries. They report shell shock occurring in cases where a man is of unstable nervous system and shows great fear, and his mind has not the proper resistance. He gets a mental suppression of vision. I think the

shell shock has a good deal to do with the psychical. It occurs in people of unstable nervous system who should not have gone into the army.

Dr. Walter Lancaster, of Boston: A great deal has been written about the ocular symptoms of hysteria and our knowledge of these symptoms is fairly complete; the contracted fields, the good orientation in spite of the contracted fields, as shown by the patients moving about without running into and stumbling on things, the reversal of the color fields, the predilection for red, so that red is seen better than the other colors, the areas of local anesthesia of skin or mucous membrane, especially on that half of the body corresponding to the eye with the greater amblyopia or more contracted field and the motor symptoms of ocular hysteria, spastic rather than paralytic.

Why, then, is the diagnosis of hysteria so often baffling? It is not simply because it must be largely made by exclusion, since it must be shown that no adequate ocular disease exists to produce the symptoms. It is not because the diagnosis has to rest on the way the ocular symptoms are accounted for.

There is something more needed to make a positive diagnosis of hysteria than the presence of isolated symptoms, such as amblyopia, without discoverable organic cause. Moreover, hysteria may exist even in the presence of organic lesions adequate to produce many of the symptoms.

My plea is that a better understanding of the nature of hysteria will help tremendously in elucidating ocular symptoms suspected of being hysteric, but about which there is uncertainty. The neuro-psychiatrists have thrown a flood of light on the nature of hysteria; and, as it seems to me, answered some of the questions raised by Dr. Teal.

Let us take a few simple cases. A soldier who has several weeks service at the front, has seen wounds, suffering and death, has suffered with cold or heat, hunger and lack of sleep so that he is pretty thoroly fatigued, finally he is standing by when a

high explosive shell falls amid a group of his intimate comrades, killing some and horribly mangling others. He himself does not receive a scratch, but is struck blind. We examine his eyes and find his media, retina, optic nerves, pupils all show absolutely nothing to account for it, and we say he was not wounded. Yet it is hardly a far-fetched figure of speech to say that he has suffered a most severe wound. He has seen a sight which was literally more than he could bear. His *consciousness* has had a wound inflicted on it of staggering severity. His eyes continue to see, but as a defense reaction, the sensation is cut off from his consciousness; and he has not the slightest idea what the explanation of his blindness is.

Again, a man passes a night of anguish, hearing wounded comrades groaning and crying for help. The morning finds him deaf, as a defense reaction against a situation which has become intolerable to him. The ability to hear is repressed or inhibited, so that altho his ears are normal, the sensation of sound does not reach his consciousness. In all such cases the reaction of the patient is a defense reaction taken to escape an intolerable situation.

A muskrat caught in a trap, reacts by gnawing off his leg above the trap, and so escaping an intolerable situation. A man in some situation involving his arm, for instance, the prospect of having to use it to hold a rifle and draw a trigger under circumstances which have become to him intolerable, reacts not by actually severing his arm from his body, but by so severing its connection with his consciousness that he is unable voluntarily to move it—it is paralyzed.

These are very simple and plain cases, but the neuro-psychiatrists are able to elucidate and explain the more obscure cases of hysteria on similar lines. I am trying to point out that here is an important field for us to study if we wish to really understand the nature of hysteria; and that unless we understand the nature and mode of genesis of hysteria, we are greatly

handicapped in both diagnosis and treatment.

Lastly, I wish to show that there is a close relationship between hysteria and malingering and that we shall be aided very much in differentiating them by acquiring a grasp of the psychology of the unconscious and the modern theories of hysteria.

The hysteric reacts to an intolerable situation, of which he is not aware, by an adjustment which is *unconscious*. With the malingerer the intolerable situation and his reaction to it are both on the level of consciousness. He knows what he is doing and deliberately deceives. The hysteric has no idea that it is because he is executing a defense reaction to an intolerable situation that he is the victim of his symptoms.

Dr. H. B. Young, Burlington, Iowa: There was a time when the diagnosis of tubercular meningitis was on the same plane as hysteric blindness. We only know that the hysteric blindness gets well. They do not like the term. They think the sickness is pretended.

Dr. E. B. Heckel, Pittsburgh: The use of the word "hysteric" is unfortunate, as it leaves a false and bad impression. I would suggest that we substitute the term "psychic amblyopia" and "psychic amaurosis".

Dr. Walter Parker, of Detroit: One clinical point: By suggestion you can get almost any field of vision you want. It is interesting to have the field taken by four or five competent observers and compared with the fields you get.

Dr. A. G. Bennett, Buffalo, N. Y.: A boy of six, neurotic, the son of a neurotic father, a marked epileptic was brought to me by the mother, who complained he had been poisoned by vaccination. He had complete external and internal ophthalmoplegia. His eyes were set as tho in plaster. His accommodation absolutely was gone. I came to the conclusion it was hysteria. I had the mother, after the child was fast asleep, tell the child: "It will be better in the morning." In four days the child was perfectly well.

Dr. C. W. Hawley, Chicago. In examining the field as to color, when it

will vary with each examination, that indicates a hysteric condition. I have examined it and in a half hour found it entirely different. There is such a thing as traumatic amblyopia in which you find the same destruction of color perception. The red and the blue in the traumatic cases will be perfectly alike but in the hysteric cases will vary greatly.

Dr. Allen Greenwood, Boston: We saw a great deal of this type of war neuroses in France. The hysteric element, the attempt to get away from an intolerable situation, was shown when the majority of the patients promptly recovered. A child with vision of 20/200 is trying to escape an intolerable situation, the school; and you can, with a little advice to the parent and to the child bring him to recovery. In the war some would escape the intolerable situation by self-inflicted injuries. They would wound the middle finger, or the forefinger, or the foot. I think they should be classed as defectives, who should not have been in the service. I think there is no one but has a limit to the situation which he can stand. We might any of us find an intolerable situation. Something is bound to break, and there is an inhibition of the central nerves. When the Day of Judgment comes we recover.

Cysticercus of the Vitreous.

Dr. Louis Love of Philadelphia, exhibited water color drawings made from a case by the late Margaretta Washington. These showed the parasite in different positions in the vitreous also a possible tunneling or tract in the choroid, before the parasite made its exit into the vitreous. The diagnosis was confirmed by the late Dr. Herman Knapp, who stated that it was the first time he had made this diagnosis in America. The case was first seen in 1906. The patient is still living, and as far as could be learned the eye has remained quit.

DISCUSSION. Dr. Meyer Wiener, St. Louis: I saw one case in my own practice at home, and one which was seen in June at Oglethorpe. According to the pictures shown by Dr. Love

this case of ours was much more active than his, and it took up most of the vitreous body. The entire history was different. Our patient was a young girl, 19 years of age, who ten months before I saw her had good vision. She consulted an ophthalmologist who diagnosed it as retinitis. She came to our service at Ft. Oglethorpe and we made a diagnosis from the large sized body and the large neck and head. It seemed to be stimulated by the light from the ophthalmoscope. All that was needed was the light to get it to come out and show itself. When I first saw the patient there was no light perception in this eye. The other eye was normal. Physical examination of the patient was negative, but in the stools we found the eggs of the tapeworm.

Regarding the treatment of these cases, I thought we would have a comparatively easy time in removing this in toto or in part. After making an incision in the sclera, using the ophthalmoscope in one hand and the forceps in the other, when I grasped the neck with the forceps, it was as tho you tried to pick up a piece of jelly. The cyst collapsed and we could do nothing further. The eye was removed therefore.

Dr. Clarence Loeb, Chicago: I want to add to the case, one I saw fifteen years ago with Dr. Carl Barck. It seemed most like a pulsating body. By close examination we could see one or two hooks. It was operated on and there was a sudden gush of fluid, but it came away, and it was followed by a scar formation in the retina and choroid. The eye got well.

Dr. James M. Patton, Omaha, Neb.: I wish to mention a case that was diagnosed as cysticercus. A young Greek of 18 or 20, consulted us on account of failing vision in the right eye. We found a vesicle in the upper nasal quadrant, but it did not have the ordinary retinal and choroidal attachments. After examining it myself and after consultation with Dr. Gifford, we decided it was a cysticercus in a quiescent state, and the parasite was probably dead. We were able to recover evi-

dence of tape worm in the examination of the stools. He gradually developed a full cataract. After we removed the cataract we were unable to find the cyst.

Dr. Allen Greenwood, Boston: In a case I encountered a mass was seen just above the macula. The next day it had moved to below the disc, and the next day it nearly covered the disc. On the fourth day it had grown larger and showed very clearly. It had moved about 5. D. and was growing rapidly. I performed a similar operation to Dr. Wiener's. I placed the forceps so they came on each side, but when they came away there was a gush of fluid and I got no cysticercus.

A War Crisis as to Eye Diseases and Blindness.

Dr. LUCIEN HOWE, Buffalo, read a paper pointing out the valuable results of studies regarding vision made in the laboratories of the aviation service; and urged the benefit of a permanent government laboratory devoted to such investigations.

DISCUSSION.—Dr. Wm. E. Bruner, Cleveland, O. Three years at Mineola have demonstrated clearly the value of medical laboratories. Young men of special ability could be encouraged to give themselves to research work; and with full remuneration so that some really scientific progress could be accomplished. The placing of the clinical branches on some such basis will be a long step towards the accomplishment of this ideal. More prompt action towards encouragement of such scientific work has been made possible thru this association. We have a good sized surplus in the treasury, and it was decided to raise the dues from five to ten dollars a year, so it will give us a fund of \$25,000. Some plan can be instituted to enlist workers in laboratory and surgical work.

Dr. R. H. T. Mann, Texarkana, Texas: I have thought a great many times of what we were going to do. How we were going to meet the need since Germany and Austria can no longer do what they have been doing for the medical profession. America

has it to do. America is the only country which can do it. The way to do it is to get the National Government under it, and convince them that money invested in this way is well spent, thus going into the saving of individual life.

Removal of Magnetic Foreign Bodies from the Vitreous.

Dr. LEE MASTEN FRANCIS, Buffalo, read a paper, the purpose of which was to discuss the selection of the route and method of removal, and especially detail the technic of extraction. The necessity was pointed out of having sufficient views of the foreign substance to establish its size and shape, the danger of exposing to the magnet an eyeball with a foreign body before knowing its location. In the selection of route and method the surgeon should be governed by the location, size and shape of the foreign body. The anterior route was chosen with giant magnet, and the posterior route with the hand magnet. He pointed out the value of the double conjunctival flap, both as an aid in extraction and a method of sealing the wound.

DISCUSSION.—Dr. E. C. Ellett, Memphis, Tenn.: Nearly twenty years ago I treated a lady who had a small metallic foreign body enter the eye, pass thru the lens and lodge in the retina. It was removed with a small magnet thru a scleral incision; the lens did not become opaque and she still has 20/20 in that eye. I think to have drawn that foreign body back thru the anterior chamber might have wounded the lens and the iris and secured a less satisfactory result.

Many of us do not have a satisfactory giant magnet available; but we all probably have access to a small magnet. With all the needed apparatus, and with experience in the use of this formidable weapon, its good qualities cannot be denied. But with instruments of more moderate power, a foreign body cannot be pulled thru the anterior chamber, unless it is of such size that its passage is attended with the possibilities of very great damage to the eye.

The matter of localization of the foreign body by the X-ray is of greatest importance. With a sufficiently powerful magnet and other favorable conditions, the foreign body may be drawn into view. But when it is in the anterior chamber, and often entangled in the iris, its removal is often very difficult. With small foreign bodies, accurately localized, my own experience is in favor of the small magnet and the scleral incision. I have used with much satisfaction, Dr. Francis' ingenious method of closing the conjunctiva over the wound.

Dr. E. L. Jones, Cumberland, Md.: The greatest danger of penetrating wounds of the eyeball is sepsis. Lymph is Nature's bactericide. I show the amount of lymph which is produced by a dose of cyanid of mercury (exhibited two bottles of lymph). Each one of these bottles represents the washing out of a body that was in the eye two hours. You can see from the enormous amount of lymph why you get these wounds restored.

Dr. E. B. Heckel, Pittsburgh: The eyeball with a foreign body in it, practically speaking, is not only a blind eye but a lost eye. In regard to the giant magnet as a diagnostic agent I want to say that it is not proper. It is foolish to guess when it is possible to know. The X-ray gives a positive diagnosis. Our practice is not to tamper with an eye; pay no attention to the history, keep it clean and have it X-rayed.

The anterior route I have absolutely abandoned. I think the best practice is to take the shortest possible route. Foreign bodies the result of flying pieces are always angular and sometimes there are several sharp points. It is risky trying to take it out the anterior way. When the current is turned on I think no man is quick enough to judge when to turn it off, in an eyeball of an inch depth. I have abandoned the giant magnet and use the hand magnet.

Dr. Greenwood: I have failed to get a foreign body with the hand magnet, then applied the giant magnet, and finally finished removing it with the

small tip. I shall always believe that in times of military stress the giant magnet is of wonderful use. You can make the diagnosis and remove the foreign body on the spot without damage to the eye. You sometimes have patients where you can't get them X-rayed, and the large magnet, such as that of Dr. Lancaster, is of great use.

Dr. Patton, of Omaha. I have found that the X-ray men are earnest, scientific, cooperative gentlemen; and if we will assist them they are perfectly willing to learn the localizing methods. Several years ago I placed foreign bodies in the eyes of animals and had them fixed; and our X-ray man worked out his technic until he became efficient in his work.

I agree with the gentleman with regard to the danger of using the giant magnet for diagnostic work. The patient is entitled to our greatest skill, and unless we do get that foreign body from the eye, it is not only lost but it may become a menace to the other eye.

Dr. C. W. Hawley, Chicago: I had the honor of removing a piece of steel that had been in the eye nearly a year, with perfect success and 20/20 vision, I always prefer the posterior route. I make just as small an incision as possible. The peculiarity that I would call attention to is that when you start to remove the magnet the piece slips. Remove it rapidly, because it will always turn on the magnet if it comes slowly.

Dr. F. Park Lewis, of Buffalo: After the foreign body gets into the anterior chamber, it very much complicates things if it is allowed to get back behind the iris. It easily gets entangled in the iris and it is important to keep it in the anterior chamber. I have seen serious complications follow.

Dr. Francis, closing: I want to express my admiration for Dr. Jones' tear vases. I agree with Dr. Jones and have demonstrated the value of bichlorid of mercury subconjunctively. I agree with Dr. Patton that not many are competent to take X-ray pictures, that can be developed to the point of making a satisfactory diagnosis and location.

Correction of Symblepharon by Use of Mucous Grafts.

George B. Jobson, Franklin, Pa., read a paper on this subject. The symblepharon is separated from lid, culdesac and eyeball, if necessary and a flap used to cover as much of the eyeball as it will. The symblepharon flap is stitched to the eyeball. A flap including mucous and submucous tissue is taken from the inner surface of the lip, stitched to the surface remaining denuded on the eyeball, and inner surface of the lid. Mattress sutures were used in the culdesac.

DISCUSSION. Dr. John M. Banister, Omaha: I have been much interested in this paper, because there is nothing more discouraging than one of these bad cases. In 1897 I did an operation on a man who was suffering from marked pannus. I referred him to another man who did nothing, but in six days he sent for me. I dissected the upper lid with great care from the cornea and everted the lid. Then I filled that eye full with sterile vaseline and put gauze over it. When I took the lid down the man was cured and never had any trouble with it.

Dr. Lee Masten Francis, of Buffalo: The late Dr. Beard of Chicago was fond of mucous grafts. He got them in a unique way by turning out the cheek with the thumb and trimming them from the buccal surface. It was less trouble than that described.

Dr. Meyer Wiener, St. Louis: This technic of Dr. Jobson's is quite similar to one advised by me ten or twelve years ago. He has merely reversed the use of the flap. Eleven or twelve years ago I utilized the scar of the symblepharon for making a lining for the lower lid, and then filled up the rest of the ocular surface with an epidermal graft, holding it in with a plate which I make of cardboard. It is easily obtained and nonirritative when covered with paraffin. It can be horse-shoe shaped, so as to be held in place and still not interfere with the cornea at all. Since having experience with it in the Army, I think we have a better means of relief by the Esser direct skin graft.

Dr. E. E. Blaauw, Buffalo, N. Y.: In the war we have learned that we can sever organs; we also take nerves and arteries, and put them in fluid and leave them for weeks and they serve a good purpose. I wish some of the younger generation may try to take mucous membranes from the mouth and cheek, and see if you can preserve them so they will be useful.

Dr. N. W. Price, Niagara Falls, N. Y.: I wish to present what we use in Niagara Falls. We have a good many cases of burns in the chemical factory. I use an artificial eye to start with, and take it to a mechanical dentist, and have him make a form of rubber the same shape as the eye and leave the cornea out. When one of these cases comes in we insert this, and he wears it until the burn gets well.

Dr. A. G. Bennett, of Buffalo: With reference to the procedure suggested by Dr. Banister, I recall that I was a student in 1890, and my preceptor everted the lid upon the forehead, and let it down in ten days or two weeks after. That was for a burn with caustic potash, and the whole conjunctiva in the front part of the eyeball, ocular and orbital was involved.

Dr. E. B. Heckel, of Pittsburg: It is better to prevent such conditions. For some time I have been using this method for burns with hot metals. The patient is put to bed, and one to two drops of one per cent solution of sterile olive oil are instilled two or three times a day, and hot pads applied. The operation depends on the kind of destruction.

Ophthalmic Education and Text-Books.

Dr. Clarence Loeb, Chicago, read a paper published in full in this Journal, v. 3, p. 121.

DISCUSSION. Dr. Edward Jackson, Denver, Colo.: Ophthalmology can be learned in two different ways. First as a branch of science, with a certain relation between its different parts; certain relations between anatomy, cases and symptoms, treatment and prognosis. That is what we have in

the average text book or article. But we must have another way of looking at disease—taking the symptoms most evident and from them reasoning our way to apply the systematic academic knowledge. The medical course gives first place to fundamental branches and the study of disease from the scientific side. After the student has become acquainted with the general field of medicine, he must study it over again to be able to cope with the individual case that comes before him; and that is what is meant by the clinical years in a medical course. We deal with words and we deal with the things they represent. But the word is of little value until it stands for its full, clear meaning in the mind of the student.

Dr. Meyer Wiener: The greatest fault in my experience, is not in the inability of the student to construct a diagnosis from his findings in a given case, but an almost universal lack of power of observation, and of systematic methods of examination. An experienced ophthalmologist glances at a patient and discovers that he has a foreign body in the cornea. He perceives a pericorneal injection, which tells him that there is an involvement of the cornea, or the iris, or both. He sees that the iris is clear or relatively so, and finds the corneal affection. To my mind, the present method of teaching, didactic and text-books, is correct; in as much as it prepares a foundation for the student so that he may have a general working knowledge of the subject. This is supplemented later by clinical teaching, which must have for its prime object the emphasis on systematic examination of the patient. A lack of systematic and careful training, of the student's power of observation is the most serious defect in the education of the ophthalmologist.

The disease must first be analyzed before it can be reconstructed from a summary of the findings. A book such as Dr. Loeb suggests would make an excellent reference dictionary of ophthalmology, but could not replace our present text books.

Dr. G. W. Boot, Chicago: I feel the

text book Dr. Loeb advocates is radically wrong. If his idea is correct, a homeopathic dictionary would be the thing. Going over your case systematically can be carried to extremes and waste a lot of time in trying to find out what is the matter with your patients.

Dr. R. H. T. Mann, Texarkana, Tex.: The text books are deficient in pictures. We should have entire picture books of diseases of the eye. We learn by seeing things. The eyes are to see with. The whole world is looking at pictures. Why not teach ophthalmology by pictures? I can learn more from a picture and a hundred times easier than to sit down and read.

Dr. Allen Greenwood: The one thing that should stand out most strongly of all the requirements is the training of the power of observation. That is the thing that most of my students lack, the power of trained observation, and that training begins from the cradle up.

Dr. Loeb, closing: The mode of teaching which is being used could be supplemented. Dr. Wiener seemed diametrically opposed, but he says you look and see a corneal injection and you think of corneal infection or iris infection. That is just what I said that students should do. But when you started out in practice you said, "Is this cataract," and you proceeded to hunt for those certain symptoms. If you had been taught the synthetic method of looking for symptoms or signs, you would have done better.

Dr. Mann's desire for pictures is good, but you cannot learn by pictures alone. I agree with Dr. Greenwood that observation is all important. The emphasis should be laid upon the symptoms or signs, and then having found them, build them up into a disease. That is the way you make your diagnosis today. When you first went out to practice you thought, "Is this a disease of this kind?" Then you tried to find if its symptoms were present; and if you were fortunate, you made a correct diagnosis, and if not, you had to make another.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

December 18, 1919.

DR. WILLIAM T. SHOEMAKER,
Chairman.

Persistent Pupillary Membrane.

DR. P. N. K. SCHWENK showed a case of persistent pupillary membrane in a girl, aged fifteen years; born in Russia; came to this country when eight years old. Personal and family history negative. The patient had measles in infancy and scarlet fever at the age of seven years. About four years ago, while attending school, she first became aware of trouble with her eyes, but was thought only to be near-sighted. Glasses were first prescribed for her at the City Hall in this city. She was reexamined each year following, but innocently consulted fake optical clinics. Her last pair of glasses were shop glasses obtained one year ago. She came into Dr. Schwenk's clinic at the Wills Hospital in November, 1919, complaining of poor vision, pain in both eyes after reading or writing and excessive lacrimation, conjunctiva nothing unusual. On first general examination cornea and pupils appeared normal. A mydriatic was ordered, and under mydriasis the pupils were somewhat irregular, but unlike that due to posterior synechia. In the right eye there are three distinct bands attached to the smaller circle of iris, brown in color and crossing the pupil to opposite side, and adherent to lens capsule in pupillary area giving an appearance of a brown membrane on lens, almost covering the pupillary area. Left eye has four bands crossing from side to side nearly at right angles, giving a brownish membrane appearance on lens capsule. In addition several fine filaments can also be seen. Right eye vision 20/200 S. — 2.50 D = 20/70. Left eye vision 20/70 S. — 3.00 D = 20/50. Dr. Schwenk feels justified in attempting to remove the capsule or membrane at the risk of having to do a curettement of lens.

Burn of Eyes By a Salt of Copper.

DR. HOWARD F. HANSELL read the report of a case published in full in this journal, p. 208.

Occlusion of Macular Artery By Endarteritis.

DR. LUTHER C. PETER reported the case of a young man, aged twenty-three years, who has recently been discharged from the service as sound. Five weeks ago vision in the right eye suddenly became blurred. Two days later, when he presented himself at the Polyclinic Hospital, the patient presented the following condition:

Pupils equal, reacted to light and accommodation and convergence. Fundus examination of the right eye showed an opaque, gray area to the outer side of the disc, including the macula. The macular twig was completely occluded. A second macular artery was seen to traverse the upper border of the opaque area and to pass on to the temporal part of the retina. The disc was somewhat hazy; arteries and veins were somewhat indistinct because of the vitreous opacities. The veins in the periphery of the field were dilated and tortuous. Fluffy white masses floated in the vitreous in the neighborhood of the disc. Field studies showed a cecentral scotoma, with contraction for form and color fields. Wassermann was feebly positive.

Two weeks later the fundus picture was somewhat changed. The ischemic area in the macula was more sharply defined; the vitreous opacities were coarser and the deposits on Descemet's membrane were visible. Field studies showed a central scotoma for form, for green and red and an enlarged blind spot of Mariotte for these same colors. There was, however, a larger scotomatous area for blue, including both the macula and Mariotte's blind spot. Peripheral fields were about the same as when first examined, with the exception of the blue field, which was almost as small as that for green.

The diagnosis was endarteritis obliterans, with occlusion of the macular twig and partial occlusion of the central artery of the retina. Attention was called to the relative infrequency of

embolism of the central artery of the retina and its branches, and particularly to an isolated occlusion of the macular artery either from embolism or thrombosis. The enlarged scotoma for blue and the contraction of the blue field relatively greater than that for red and green was indicative of involvement of the choroid, the contraction of the blue field being an early evidence of nutritional disturbance of the neuro-epithelial layer of the retina.

Unusual Form of Proliferating Retinitis.

DR. PETER showed an unusual form of proliferating retinitis in a young woman, aged twenty-eight years, whose history was entirely negative as to injury either at birth or subsequently. The patient discovered accidentally six years ago that her right eye was bad. Vision in this eye is 2/200, vision in the left eye 20/20.

Three distinct pathologic changes were present in the eye-ground: (1) Atrophy: There was evidence of atrophy of the temporal half of the disc, the macular twigs being very small, and there was also some contraction of the central artery of the retina. (2) Central choroiditis: A rather large atrophic area surrounded by pigment was observed below and including the macular region and extending toward the disc. In addition there was some mottling of the retina immediately around the disc. (3) A band of proliferating retinitis: This consisted of a regular diaphanous ring, bluish gray in color, about the width of the central artery of the retina. This ring began below the disc, passed around it in an oval fashion about one disc diameter away from it above, then finally terminated down and in blending with the surrounding retina. This ring was delicate, distinct and anterior to all the retinal vessels and slightly undulating below, where it was best observed with +4 D. It was not so well defined as the proliferating bands usually observed after trauma.

The author felt that the ring was the result of an injury probably received at birth or in early childhood and represented

a tearing away either of the anterior limiting membrane of the retina, or of the posterior limiting membrane of the hyaloid body, the edges of which had undergone a proliferative process and, therefore, had become visible with the ophthalmoscope. In the author's experience this case was unique.

Coloboma of the Macula.

DR. L. F. APPLEMAN presented a case of bilateral, symmetric coloboma of the macula, which was seen in Dr. Holloway's clinic at the Wills Eye Hospital. Vision had always been poor, especially in the right eye, which showed exotropia. When first seen her vision was: R., 6/60, L., 3/60.

The ophthalmoscope revealed a lesion in the macular region of each eye about one and a half disc diameters in size, with clearly defined edges and excavation amounting to about three diopters. The whole surface showed considerable pigmentation. The retinal vessels could be traced across the affected area. The optic disc in the left eye was atrophic but in the right eye was of good color. The peripheral portions of the retinae were normal. The Wassermann reaction was negative.

Orbital Periostitis.

Dr. Wm. Zentmayer made a further report on a case of exophthalmos, with bilateral ophthalmoplegia. The patient was shown at the October meeting. Shortly after this a slight redness of the skin of the lid was noticed and palpation for the first time caused pain. There was also some spontaneous pain. There was a high leukocytic count. An incision was made into the orbital tissues along the supra-orbital margin near the outer canthus and about a dram of pus was liberated. Motility of the eye on the opposite side to the exophthalmos was restored at the time of complaint of pain. Since the drainage of the pus the exophthalmos is slowly receding, the neuritis has subsided and the movements of the eye are increased. From the facts that there was not a continued flow of pus and that the pointing occurred at the

outer canthus the probability is that the condition was one of periostitis.

Asthenopic Eyes.

DR. S. D. RISLEY read a paper on "Some Recent Observations in Asthenopic Eyes," the full text of which will appear in this journal.

DISCUSSION. Dr. Howard F. Hansell said it was difficult for him to understand the reason for Dr. Risley's statement that the visibility of this ring is possible only with the retinoscopic plane mirror armed with +2 D. If the ring is a deposit on Descemet's membrane it should be seen with the aid of the loop or by indirect examination. If it is only a shadow near the periphery of the cornea and due to lack of uniformity of curvature of the center and periphery its relation to uveitis is not clear.

He will take the first opportunity to look for the ring and hope to be able to verify, by his own experience, Dr. Risley's interesting discovery.

DR. S. LEWIS ZIEGLER stated that he had not observed the condition described by Dr. Risley but thought that any such opacity in Descemet's membrane could be studied by using the S + 16 D lens in the ophthalmoscope to magnify it.

Extensive Sclerosis of the Choroid.

DRS. T. B. HOLLOWAY and A. G. FEWELL (by invitation) reported the history of a man, aged fifty-three years, who came under observation at Dr. Holloway's clinic at the Wills Hospital. He stated that he had had poor vision since childhood, but that he could read fairly well until twenty-six years ago. Since that time the vision has been much reduced, so that only large objects could be recognized.

The patient has a high myopia, but he has not been able to secure satisfactory glasses. There is no history of consanguinity. The patient has four brothers living, all of whom have poor vision, and four children living and well, and but one wears glasses. Two children are dead, one dying at the age of sixteen from pulmonary hemor-

rhage. He states he has always enjoyed good health and he has been temperate in his habits. His general physical examination failed to show anything of consequence aside from excessively bad teeth, with marked pyorrhea. The nasal examination showed marked deviation of the nasal septum, with some enlargement of the turbinates. The Wassermann test of the blood was negative.

In each eye the vision is reduced to counting fingers at two feet. The ocular adnexa are normal, corneae clear, anterior chambers rather deep, and pupils react normally. The tension of the right eye is 27 degrees and of the left 24 degrees. The intraocular examination of the right eye shows delicate posterior central lenticular disturbance, with scattered pinpoint opacities and punctate vitreous changes. The disc is markedly atrophic, with a large excavation. Extending from the disc well out beyond the macular region and to the midzone above and to the nasal side below there is a widespread sclerosis of the choroidal vessels. In this area all degrees of vascular change may be noted from delicate white vascular markings to complete fibrosis. In the extreme periphery there are also marked evidences of sclerosis, but not to the same degree. Both sets of retinal vessels are contracted to a minimum, the arteries being only threads. The left eye shows delicate central posterior opacities with slight linear scratches, also punctate vitreous opacities. The disc shows advanced atrophy with large excavation on the temporal side. To the temporal side of the disc and involving the macular region there is the same tendency to uniform fibrosis of the fundus structures as has been described for the right eye. The area of excessive changes on the nasal side above and below is not quite as marked as in the fellow-eye. Scattered about the periphery and central portions can be noted discrete but small clumps of pigment. The retinal vessels show the same excessive contraction.

J. MILTON GRISCOM, M. D.,

ABSTRACTS

Ch. Lafon. Pithiatic Spasm of Convergence and Accommodation. *Ann. d'Ocul.*, 1919, vol. 156, p. 449.

After the appearance of Babinski's work, reports of cases of hysteric contractions almost disappeared from the literature, altho they had previously been very numerous. This was due either to the fact that they were really very rare, or that authors became more careful in their diagnoses. Even the war, with its emotional states, has brought only two cases. But the author has seen 7 cases in 18 months in a total of about 2,700 patients.

The ordinary method of testing associated movements is faulty in that it causes convergence at the same time. To obtain the former alone, have the patient hold his head immovable and look at an object about 45° to right or left, held so that it is not hidden by his nose; upward, have the patient look at an object held high up, or at the sky; downward, have the patient throw his head as far back as possible and look at an object in front of him.

Three different tests must be made; (1) movements of convergence, (2) movements of direction, (3) movements of direction combined with those of convergence. There are three clinical types of spasms. 1. Simultaneous spasms of accommodation and convergence. 2. Spasm of convergence. 3. Spasm of accommodation. Of 1 there are two varieties, (a) permanent and tonic, and (b) intermittent and clonic. Cases illustrating all of the foregoing forms are given. C. L.

Georges Weill, Extraction of Senile Cataract with a Lance Knife. *Ann. d'Ocul.*, 1919, v. 156, p. 338.

Georges Weill reviews the history of the development of its form and use. He has used the following method in about 400 cases with very satisfactory results:

Fixing the eyeball at the horizontal meridian, he introduces the point of

the lance in the corneoscleral region a little to the left of the vertical diameter and pushes it parallel to the iris very quickly towards the inferior angle of the anterior chamber. On drawing it out, always holding it parallel to the iris, he prolongs the incision in the limbus until it seems large enough, after which he follows the Graefe method. He claims:

(1) The incision requires no counter puncture and is very easy.

(2) The shape of the lance and its method of insertion delays the escape of aqueous and prevents cutting of the iris.

(3) The iris regains its position spontaneously or by simple massage of the cornea and rarely prolapses into the wound.

(4) The anterior chamber reestablishes itself more quickly than when Graefe's knife is used, lessening the danger of infection and making a conjunctival flap unnecessary.

(5) Postoperative astigmatism is less pronounced as the wound is more regular and the lips adapt themselves much better. C. L.

E. Lindgren — Extraction of Secondary Cataract. *Hospitalstidende*, vol. 66, p. 1230.

The author reviews prevailing methods of dealing with secondary cataracts and then describes his method used in cases of thick and dense secondary membranes following iritis. When 6 to 12 months have elapsed after extraction he makes an incision with a broad cataract knife or with a keratome opposite to the coloboma. Using Axenfeld's synchiotomes, he cuts the adhesions of the iris to the pupillary membrane, then grasps the membrane in the lower part with a sharp iris hook or with Arlt's iris forcep and rolls it up thru the anterior chamber and out thru the wound where it is snipped off as close as possible. In two cases a drop of vitreous was lost but in three others none appeared. D. L. T.

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A STUDY OF LOCAL ANESTHETICS.

The Committee on Local Anesthetics of the Section on Ophthalmology, A. M. A., has sent out a circular letter of inquiry, for the purpose of obtaining information as to the personal experiences of the recipients with the various local anesthetics. From the replies received, it is their intention to formulate a report for presentation to the Section either at the New Orleans meeting or some later one.

This method of obtaining data is theoretically the ideal one, for no matter how extensive and varied the experience of any one man, or any small group of men may be, it can never equal that of the profession as a whole. Unfortunately, however, such circulars are often neglected or even ignored. The busy practitioner defers answering until some more convenient time—which never comes; and the less busy one modestly thinks that his relatively slight experience has little statistic value. The result is that usually only a small percentage of such letters are answered and the investigation does not yield its richest fruits.

No matter how busy a man may be, he can always find time, if he really wants to, to give brief answers to the relatively few questions asked. When circumstances demand an extensive review of case records, a preliminary answer can be given, and a more detailed report sent later. Where time is plenty and experience scant, none the less the answers should be sent in promptly. It is entirely possible that the data obtained from a careful study of a few cases may furnish information lacking in the returns from a more hasty survey of a larger mass of material.

It is probable that all of the oculists in the country did not receive letters, but there is no doubt that the committee would be glad to receive data from every source. The information acquired and the conclusions drawn therefrom will be at the service of the entire profession; and each member thereof should do what he can to aid the committee.

For the benefit of those who did not happen to receive a letter, but who desire, nevertheless, to help, the questions asked are reproduced:

(1) What local anesthetics do you use at present, and in what strength?

(2) Do you use one local anesthetic for all classes of cases? If not, give particulars.

(3) What special reasons have you for your preference as to the local anesthetic, strength and cases?

(4) Have you abandoned or decreased the use of any anesthetic that you have tried? Give reasons.

(5) Name and state briefly your experience as to the following points for all the local anesthetics which you have tried. (Where more than one anesthetic has been used extensively, explain each in detail). (a) Strength or concentration for superficial anesthesia, (b) for deep anesthesia, (c) time of onset and duration in both cases, (d) degree of irritation both cases, (e) effect on vascularity, (f) effect on pupils, (g) effect on accommodation, (h) effect on corneal epithelium, (i) effect on intraocular tension, (1) normal, (2) glaucoma, (j) occurrence of systemic intoxication, (k) stability of the solution including effect of sterilization by boiling, (1) effect of addition of epinephrin on intensity of anesthesia, and duration of anesthesia.

The answers are to be sent to Dr. Albert E. Bulson, Jr., 406 W. Berry St., Ft. Wayne, Indiana.

There are few questions which more vitally concern the oculist than that of the choice of an anesthetic which shall be at the same time efficacious, safe, reasonably swift in its effect and constant in its action. It is difficult to say which of these four factors is the most important. Safety is almost imperative, and yet if the danger is as slight as it is in cocaine, for example, it can be neglected, and the drug chosen in preference to one which is entirely harmless, but which is inconstant in its action. If we cannot depend on the anesthetic quality of the drug, or if it is sometimes swift and sometimes slow, it would better be discarded in favor of one which is more reliable.

These points are embodied either directly or indirectly in the questions given above, as well as others of greater or less importance. It is to be

hoped that the replies will be so numerous that the Committee will be able to make a comprehensive report in the near future. If you have not answered your letter, *do it now*. C. L.

RELATION OF OPHTHALMOLOGIST TO DISPENSING OPTICIAN. THE COMMISSION EVIL

Years and years ago when ophthalmology was young, our professional fathers thought little of the routine work of measuring the ocular refraction, and were not at all disposed to dispense spectacles; they wanted to be known as eye surgeons. Thus in England they referred people whose eye symptoms called for correcting lenses, to a member of the "Worshipful Company of Spectacle Makers."

Forty years or more ago, thru the work of Donders, Landolt, Cuignet, Burnett, and many others, an impetus was given to the study of the refraction of the eye. A little later an influx of writing came, in which some of our present readers participated, resulting in the wide spread of this knowledge, so that now a very large part of the oculist's work consists in the measuring of eyes for glasses. Endeavors have been made to restrict this work to properly qualified medical men, but it didn't go! The spectacle sellers have flourished, until now there are as many as there are of oculists.

It is an axiom that a professional man is a brain worker, that he is paid in fees for such work, and that he is not to be classed with those who make their living by selling goods. There is no law against the doctor being a purveyor, in fact in sparsely settled communities, he must dispense his own medicines, dressings and all apparatus needed for help to his patient, and by rights he makes a charge for such materials; some do so at cost and some at a profit.

The oculist of the small town must do the same. He may carry a lot of stock lenses and fittings, sending his compound prescriptions to a wholesale or manufacturing optician by mail,

making a charge for his professional fee, and an additional charge for the glasses. This is a perfectly correct procedure and under such circumstances must be continued.

The ophthalmologist of the larger city has the choice of dispensing the product of his work in a similar manner, and there is no special objection to this, altho it is not to the advantage of any of the parties concerned. He usually does this for business reasons, to make a profit on the sale of the glasses to his patient, in addition to his professional fee. His customer is not imposed upon for he could get the glasses no cheaper from the retail optician. But in a way it is a waste of the surgeon's time; and really it is not as profitable as it may seem, for at the best the profit from lenses can hardly be more than one or two hundred dollars a month.

The other choice is to restrict the business to his examination, prescription and supervision, only charging a fee for his professional work.

Let us show you that this method is the really professional one, and that it is not only better for the patient but also the best for the oculist from the business standpoint. In a large city the oculist has a choice of anywhere from one to dozens of skilled spectacle frame fitters, whose time is less valuable than his own, who can afford to fiddle away a while with a particular patient in adjusting the frames, and who are satisfied with the average profit they make in the sale. They too are specialists and under the guidance of the medical man usually fit the frames better than can the surgeon.

True it is that a class of "refracting" opticians ("save the mark," and excuse the bending or crooking—for to refract means to bend) has grown up; and some of them do creditable rule of thumb work. But there are also nearly pure dispensing opticians, who may be recommended. Now if the oculist will work with the optician, doing the head work and allowing him the mechanical side, the whole job will cost no more to the patient, and the work will be better done.

From the business side of the question, the ophthalmologist, who does not dispense glasses, benefits by patients referred by the optician,—in a money sense to a greater extent than he would by taking the paltry profit from selling glasses to his patient; for on a few references a month will bring him more in fees. The optician is likewise trained that his province is to sell glasses, and not to measure eyes or to give advice, and he thus refers more cases to the oculist.

Now we come to a real abuse. This is the receipt of commissions from the optician, however disguised by other names. It is a common practice for a very large proportion of eye doctors, be they members of societies that interdict such procedure or not, to receive from a favored optician a monthly premium, bonus, stipend, dividend or commission, depending upon the amount of business sent in. This has grown so common that it is almost an accepted custom in many localities, particularly west of the Mississippi. None of the men who do this care to discuss the matter, none of them let their patients know of this extra commercial profit, none are proud of the procedure, but they take the money all the same.

Times have changed so some of them have lately seen the light, realizing that custom does not make right, and that this little graft is comparable to the reception of or giving of commissions of referred patients, or to collusion with the druggist in his profits. The business rule in professional work is that the patient should know for what he pays, and where his money goes. Any other way isn't done, you know, amongst the men we look up to in professional life. While not against the laws of the land or written ethics, it is bad form at least. Can't you see that the patient not only trusts you with his health but also in a measure with his pocket book, and that he should not be compelled to pay two profits for one purchase? The cost of the eye doctor's commission is always added to the cost of the glasses if business is done in this way, and of this the purchaser may not be aware.

If we can appeal in no other way to the secret profit taking members of our profession than from the business side, we must by showing them that they are not only losing face but money too thereby. If they will restrict their sales to the products of their brains, a better feeling will arise between the merchant of optical goods and the professional man; and the optician will refer more or all of the cases applying to him, to those physicians doing straight professional work.

H. V. W.

WHICH ARE OUR BEST PAPERS?

Good ophthalmic literature should arouse and hold the reader's interest, and it should meet his needs. As to what are the most important needs of our readers in the direction of literature relating to ophthalmology, there is some opportunity for difference of opinion, and academic discussion. But in that discussion the reader himself should have the first hearing. Even tho he be not widely acquainted with the literature of his specialty, or skilled in writing, or in criticism, his idea of what he needs must be the starting point and basis of any such discussion. He is at least as likely to know what he needs as anyone else; and when it comes to stating what arouses and holds his interest the reader is the only authority.

We wish the papers published in this journal to conform to the above definition of good ophthalmic literature. No editor and no editorial board can secure this without an expression on the part of readers, as to what interests them and meets their needs; and this expression should represent the ideas of as many readers as possible, and come from the most widely differing points of view.

We must ascertain the needs of the man who has read little of the literature of ophthalmology, as well as those of the man who has read much, the man whose interest is in the practice, as well as the man whose interest is in the science; the man who is striving to manage ordinary cases, as

well as the man who is seeking to study an unusual condition; the one who likes to operate, and the one who does not; or we shall fail to get the best light on the kinds of papers that ought to be published in this journal.

Will you not help by answering the questions: What papers are most interesting? What papers best meet your needs? We will not publish what you write without your express permission. We hope the replies will be too numerous to publish more than a few of them. We do not want finished essays on what our journal should contain. But tell what interests you, what helps you. Name three papers published in this volume that you think are best, and the one that you think carries least value for the space it occupies. Give briefly your reasons and any clear strong thought you have on this subject.

Every member of a profession ought to desire to improve its literature. Here is a way that each can contribute something in that direction. Whatever this collective investigation yields will be worked up and reported, so that it can be discussed and utilized for the general good. Editors and writers need to be made conscious of the impressions of readers. Readers would often like the chance to criticize, or talk back. This is your opportunity.

E. J.

BOOK NOTICES.

Contributions to Medical and Biological Research. Dedicated to Sir William Osler, in Honor of his Seventieth Birthday, July 12, 1919. By his Pupils and Co-Workers. 2 volumes; illustrated, pp. XL-1268. Paul B. Hoeber, New York, 1919. Published by subscription only.

After many delays, due to printing trade difficulties, this important work has finally been distributed, reaching the much beloved and widely mourned physician for whom it was prepared only a few days before his death. Ophthalmology was well represented on the Publication Committee of 18 British and American medical men, by

Drs. George E. de Schweinitz and Casey A. Wood, the latter acting as Secretary. Altho all the contributions are of interest to the ophthalmologist and should be read by him, certain of the papers especially demand his attention.

The first of these is J. George Adami's communication on the problem of graduate medical study in London—an attempt to point out how the wealth of clinical and other teaching material of the metropolis can be made available to English speaking (and thinking) students. Adami believes that the "only students who have thus far been completely satisfied with their graduate work in London are those who have confined themselves to a single specialty, or to the work and opportunities afforded by a single hospital." He instances the experience of students of ophthalmology, who are uniformly enthusiastic over the facilities extended by Moorfields; of the Great Ormond Street hospital for pediatrics, and for neurologists by the hospital in Queen Square. In the same way, physicians and surgeons placing themselves under a few of the teaching staff in some one of the great general hospitals have been entirely satisfied with the result.

It is useless, as has been demonstrated in the past; to urge attendance upon the weekly curriculum of lectures and demonstrations at the various London hospitals, until these have been thoroly organized as to time and place, so that it will be possible for the student to be present at widely separated clinics at different hours of the day. Happily such readjustment of schedules has taken place, and the special student may now spend the whole day at various hospitals in the pursuit of some particular line of medical or surgical study.

A research in the history of medicine, exemplified by Raymond Crawford's "Antoninus Musa; His Practice and Patients," is well worth the attention of students of early ophthalmic literature. In 22 B. C. he was the successful court physician of Augustus Cæsar, and the author of at least

two treatises, one of which was on the Fox-tail, Betomy of Linnæus (*Betonica alepocurus*), a plant in the period extensively employed in diseases of the eye. In the tractate, "De Herba Vetonica," its internal employment especially is extolled as an almost infallible remedy for forty-seven diseases, the second, third, fourth, and fifth being, respectively, "painful eyes," "headache," "dimness of vision," and "watery eyes."

In the second treatise, on the prevention of disease and the preservation of health, Musa contends for many of the precautions ordinarily found in present day treatises on hygiene; and it is a question whether a modern sanitarian could greatly better the rules laid down in this small treatise.

James M. Anders studies "Myxedema and Cretinism in the United States and Canada," and discusses their eye symptoms in tabular form, easily accessible to the student.

George Dock's "Oxycephaly and Exophthalmos" is almost a purely ophthalmic contribution, which should be read in its entirety by the specialist in eye diseases. The ocular signs (especially the optic neuritis and atrophy) with the "causes of blindness," as well as the intracranial conditions that are involved in these are fully discussed. Dock reminds us that slight attention was at first given to Friedenwald's suggestion that increased cerebral pressure being the main cause of the loss of sight, it should be met by a decompression operation. The reason for this lay in the fact that a large number of cases of pronounced oxycephaly were not accompanied by optic nerve disease, and in still fewer was papilledema demonstrated. Now, however, increased intracranial pressure should always be suspected, and when demonstrated should be dealt with accordingly.

Harry Friedenwald's contribution to the "Visual Disturbances in Polycythemia Vera" quotes Osler as the first one (in 1903) to examine and report upon the condition of the eye grounds in this rather rare disease, altho Lucas collected (1912) reports of 189 cases

of which eye signs were present in 30 per cent, and an ophthalmoscopic examination was made in twenty-six instances. This roster includes the remarkable case reported by Parker and Slocum, but does not, of course, record Christian's series of cases (1917) in practically all of which visual disturbances occurred. If there is one lesson to be learned from Friedenwald's paper it is the wisdom of using the ophthalmoscope in every case of disturbance of sight, however trifling it may seem.

The ophthalmologist may read with much benefit Arthur Hurst's "What the War has Taught us about Hysteria," if for no other reason than that a discussion of the ocular manifestations of that puzzling condition forms a considerable part of his contribution. He contends that "hysteria is a condition in which symptoms are present which have been produced by suggestion and are curable by psychotherapy." He follows this definition by the statement that the investigations of Babinski have shown the fallacy of a belief in the *stigmata* of hysteria. That, for example, the anesthesia supposed to be characteristic of hysteria is merely the result of unconscious suggestion on the part of the observer; further, that the constricted field of vision (one of Charcot's chief *stigmata*) does not exist, if one searches for it by means that do not suggest it as the perimeter does. The same observation is made of the "inward spiral" field, as demonstrated both by Symns and the writer. This essay, however, must be read in its entirety to be appreciated.

Fritz B. Talbot contributes a paper of interest to the ophthalmic surgeon, "Aneurysm of the Middle Cerebral Artery in a Child," in which there was pin-point contraction of the right pupil; and left sided mydriasis. Apparently, there were no visual disturbances.

A. S. Warthin's contribution—"A Case of Ayerza's Disease"—might well be read in conjunction with Harry Friedenwald's paper. The author claims priority for Ayerza, over Vas-

quez and Osler in the description of at least one type of Polycythemia. In Spanish-American literature Abel Ayerza of Buenos Aires is recognized as having described in a clinical lecture delivered in 1901, the syndrome (*cardiacos negros*) of chronic cyanosis, dyspnea, erythemia and pulmonary sclerosis.

Of several neurologic contributions having especial ophthalmic interest there is only room here for a passing notice of William G. Spiller's "Cerebral Monoplegia." Attention is drawn to the history (p. 1182) of a case in which the ocular signs were of importance—viz: an early unilateral papilledema. At the writer's request, Dr. A. C. Wood exposed the left motor parietal region and a small tumor was found in the center of the upper limb.

Edward Jackson's "Chronic Tuberculosis of the Choroid," finely illustrated by a colored drawing of the fundus oculi, is an admirable contribution to the subject, based on the continued observations of a case extending over a period of eight years, thus constituting a record of particular value in an affection that is commonly supposed to run an acute, rather than a long-drawn-out course. The interesting and instructive story of the first lesion (macular), of the first relapse and of the later activity, as shown by the ophthalmoscope, should be read to be appreciated.

A second contribution to the history of ophthalmology is a paper by the late Mortimer Frank on the "Schematic Drawing of the Eye," especially of those anatomic figures that appeared in the fifteenth and sixteenth centuries. Sudhoff found an anonymous *Anatomia oculi* on the back page of a thirteenth century MS., from the Sloan's collection in the British Museum, in which, with several fallacies, some of our modern discoveries (?) are distinctly pictured. From this date onward Frank chronicles and describes the various ocular maps, to the days of Georg Bartisch (1583) and his well-known drawings. The whole es-

say is of great interest to the serious student.

John E. Weeks has a well illustrated and practical paper on a "Minute Intraocular Sarcoma" requiring removal of the eyeball, together with the histologic findings. The author believes this tumor to be the smallest of its kind reported in ophthalmic literature, and he had an opportunity to watch its growth from the earliest beginnings. The clinical history comprises not merely the symptoms, but perimetric measurements, pencil drawings, and ophthalmoscopic findings, ending in an illustrated postmortem examination, all of which constitute an unusual and most instructive series of observations.

That the subtitle relating to "biological research" of these volumes might be represented in an ophthalmic sense, Casey A. Wood contributed a paper on the "Eyes of the Burrowing Owl," in which the fundus is illustrated by a colored drawing that shows the orange-red color, so characteristic, not alone of owls, but of nocturnal vertebrates generally.

It was the avowed intention of the Committee to produce volumes that would appeal to bibliophiles as examples of unusually fine book-making; and altho the exigencies of the World war largely prevented the accomplishment of the scheme, yet in paper, print, initial letters, frontispiece and binding they are not unworthy of the master they were intended to honor.

C. A. W.

Transactions of the Ophthalmological Society of the United Kingdom. Vol. 39, 475 pages. Illustrated. London, J. and A. Churchill.

This volume contains the papers presented at the annual session in May, 1919, with the rules of the Society, the list of its members and officers, the reports of the latter, and of its Council, the business body of the organization. These occupy about two-thirds of its pages. The remainder are given to scientific papers and discussions before its affiliated societies. These are the

Oxford Ophthalmological Congress, The Midland Ophthalmological Society, The Irish Ophthalmological Society, and the Ophthalmological Society of Egypt, the fifth affiliated society, that of the North of England, not being represented in this volume. The illustrations include 10 plates of which two representing chorio-retinitis and avulsion of the optic nerve are in colors; and there are 31 figures in the text.

The war volumes of this series showed some reduction in size, and in the quality of paper and printing; but in the present volume the prewar standard has been largely regained. In the number and scientific value of its papers this volume compares favorably with any of its predecessors. There is no marked difference in quality between the communications made to the main society and those made to the affiliated organizations.

The Bowman Lecture, by Victor Morax of Paris, upon Plastic Operations, and the Doyne Memorial Lecture on Preventive Ophthalmology by J. Herbert Parsons, are the most extended and formal communications. The discussions on the "Visual Requirements of Aviators," and on "Eye-sight in connection with Education," are each based on three opening papers, and are of great value. But the shorter individual papers and reports of which there are more than fifty, give the peculiar character and value of these transactions. Many of these are very brief, less than a page; but they are all worth while. The volume should be owned and read by every English speaking ophthalmologist.

E. J.

Swanzy's Handbook of the Diseases of the Eye and Their Treatment. Edited by Louis Werner. Twelfth Edition. 690 pages, 273 illustrations in the text and 9 colors plates. Philadelphia, P. Blakiston's Son and Company. Price \$6.00.

The great general works on ophthalmology in the English language have all been of gradual development.

They have passed thru many editions, keeping up with the progress of ophthalmic science, filling in gaps in the presentation of it, pruning away the least valuable matter; and finally attaining a uniformly high literary quality, as well as a massive quantity of information of the greatest value to the ophthalmologist. This work has thus earned its place in the front rank of ophthalmic text books. The original author carried it thru nine editions. Then he received the assistance of Werner. Since Sir Henry Swanzy's death, two editions have been brought out by his successor.

It is a larger book than at first appears. The paper on which it is printed, tho of excellent quality, is thin as compared with that used in many other books of its class. The blank margin is much narrower; and a large part of the work is printed in quite small type, which gives as much text to the page as we find in the larger works. Then the illustrations, altho clear and sufficient, occupy less space in this work than in some others. So that this book, altho not the largest book in the class of systematic general treatises on ophthalmology, ranks with the largest of them.

Of the general soundness and clearness of its teaching, nothing need be said, since a generation of ophthalmologists has passed favorable judgment upon it as regards these qualities. The principal changes found in the present edition, are a rearrangement and reclassification of diseases of the cornea, with recognition of some of the recent work in this department including Kuhnt's conjunctival flaps and Magitot's transplantation—"deferred keratoplasty." There is an account of the etiologic diagnosis of uveitis, and the most recent work on cortical visual centres, and the localization of foreign bodies. The present edition will hold the high esteem won by its predecessors as a work which so well combines fundamental science with practical clinical art

E. J.

CORRESPONDENCE.

Leucosis Retinae

To the Editor:

The article of Drs. R. C. Smith and Thos. Hall Shastid in the February number of the JOURNAL prompts me to write a few remarks as to the term "Aphykia Retinae." First and most essential is the supposition that the pigment of the 10th retinal layer has been absorbed. How can this be proven? "By the extreme visibility of the choroidal vessels?" But we find normally all degrees of visibility of these vessels, from the condition, where none are visible to where they are well visible.

I like to state that the transparency of the coats of the eye is very variable. In the heyday of transillumination some observations were published, where by putting the lamp at the equator bulbi the iris would show rather reddish. This condition can be found quite often if looked for. Within the last six months I have seen about half a dozen cases where the iris could be found transilluminated by putting the electric light at the equator bulbi. Two such patients I have shown at meetings of the Buffalo Ophthalmological Club. Such cases show that the pigment of the retina must also be more permeable for light than normally. The condition has nothing to do with Albinism, as Fuchs supposed. When this condition can be demonstrated to exist in the anterior half of the bulb it can be expected also for the posterior half. The name LEUCOSIS RETINAE has been suggested, and appeals to me much more than Aphykia, which reminds one too much of Aphakia.

It is rather disconcerting to find that many writers consider the retinal pigment layer as belonging to the choroid. I believe this to be the effect of the French school of Ophthalmology, which is expressed profusely in the *Encyclopédie d'Ophthalmologie*. I fully agree with the writers of the article that the pigment layer belongs to the retina, and should not be counted as part of the choroid.

It is an unproven assumption that "wearing of spectacles . . . stimulate the formation of visual purple." The last sentence "When the retina is transparent, it is only because the outermost layer of that structure, the pigmentary layer has been *absorbed*" (*italics mine*) gives rise to much opposition as every healthy retina except the outer layer, is transparent, invisible, under ordinary circumstances of examination and illumination. Only when we change the light, as Vogt has done with his red-free illumination, becomes the retina visible.

E. E. Blaauw,

Buffalo, N. Y.

BIOGRAPHIC SKETCHES.

T. H. SHASTID,

SUPERIOR, WISCONSIN.

JACOB DENNIS ARNOLD, an eminent San Francisco ophthalmologist and oto-laryngologist, founder of the San Francisco Polyclinic, was born at Baltimore in 1855, and was graduated from Georgetown College in 1871. Three years later he received the M. D. at Washington University, Baltimore, being, it is said, the youngest graduate of the college up to that time. He then went to Europe, where he studied the eye, ear, nose and throat for several years.

Returning to Baltimore, he practiced in that city for a time, but, in 1884, having married, he removed to San Francisco, where he practiced as ophthalmologist and oto-laryngologist until his death. After he founded the Polyclinic, Dr. Arnold devoted the most of his time to its welfare. He was, for a very long time, the president of this institution, as well as the professor of diseases of the eye, ear, nose and throat therein. For several years he spent his summers in Alaska, and there was stricken with the disease which caused his death—carcinoma of the pancreas. He died at his home in San Francisco, September 26, 1919. Besides his widow, he is survived by two sons and two daughters.

BENJAMIN FRANKLIN CHURCH, a prominent California ophthalmologist, was formerly dean of the faculty and professor of ophthalmology and otology in the College of Physicians and Surgeons, Los Angeles. Born in 1858, he received his medical degree at the College of Physicians and Surgeons, Baltimore, in 1888. At just what time Dr. Church began to limit his practice, or when he removed to California, could not be learned. He was once president of the Travis County and Kaufman County (Texas) Medical Societies, and president of the Los Angeles Academy of Medicine. In 1917 he was chairman of the eye, ear, nose and throat section of the Medical Society of the State of California. He had been under treatment for mental troubles for about eight months, when he leaped from a window on the tenth floor of an office building, September 2, 1919, dying instantly.

WARWICK MILLER COWGILL, a well known ophthalmologist of Lincoln, Nebraska, was born at "Elmwood," Fulton county, Kentucky, April 3, 1857, son of Mary Miller and Nathaniel Newlin, Cowgill. He graduated at Kenyon College, Gambier, Ohio, in 1881; and at the Medical Department of the University of Louisville, Ky., in 1883. He proceeded at once to New York, where he studied in the Manhattan Eye, Ear, Nose and Throat Hospital, and the Ophthalmic and Aural Institute. For eighteen years he practiced the eye, ear, nose and throat at Paducah, Ky., and, for the rest of his life, at Lincoln, Neb. He was ophthalmic and aural surgeon to the Louisville and Memphis Division of the Illinois Central Railroad. He married on October 27, 1886, Alice Blake Parker, by whom he had two children. He died at Lincoln, Nebraska, December 29, 1919.

CHRISTIAN RASTUS HOLMES, a famous American ophthalmologist, was born at Veile, Denmark, October 18, 1857, son of Christian R. and Karen Mickelsen, Holmes. He received an elementary education in his native country and a fairly comprehensive course in civil

engineering in Germany. On the death of his father he brought his mother to America, and the two lived for a time at Syracuse, N. Y., and later at Vin-

sistant by Dr. Joseph Aub. One year later, Dr. Aub died, and the greater portion of his practice fell to his former assistant.



Christian Rastus Holmes, 1857-1920

cennes, Ind. In both places he worked as a mechanical draughtsman. In 1886 he received the degree of M. D. at the Miami Medical College.

For a time he engaged in general practice, but soon was employed as as-

Dr. Holmes's rise to fame was rapid. He was an excellent operator, a fluent speaker, a man of immense executive ability. He was ophthalmologist and otologist to the Cincinnati Hospital from 1888-99; professor of otology at

the Miami Medical College from 1890 to 1904; professor of ophthalmology to the Laura Memorial Medical College and Presbyterian Hospital from 1892 to 1903; consulting ophthalmologist to the Cincinnati Hospital from 1908 until his death; a medical director of the Cincinnati General Hospital; advisory commissioner to the New Cincinnati General Hospital; and professor of otology in the College of Medicine of the University of Cincinnati from 1904 until his death.

From its inception he was dean of the Medical Department of the University of Cincinnati—a school which he founded by securing the merger in 1909 of the Ohio and Miami Medical Colleges. He was a member of the American Ophthalmological Society, American Otological Society, American Laryngological Society, a Fellow of the American College of Surgeons, President of the American Academy of Ophthalmology and Oto-laryngology, 1901-2; Vice President of the American Medical Association, 1902-3; and chairman of the section of laryngology and otology, 1904-5; Chairman of the section of ophthalmology, 1905-6; President of the American Laryngological, Rhinological and Otological Society, 1908-9. In 1917-18 he was a major, in charge of the eye, ear, nose and throat department, Base Hospital, Camp Sherman, Ohio. For eighteen months he worked almost continually. As a result, he was very much enfeebled, so that, at least indirectly, his work for the soldiers was, later, the cause of his own death.

Dr. Holmes was a man of medium size, inclined to stoutness, and of a somewhat ruddy complexion, with blue-gray eyes and dark brown hair. He was brisk, jolly, and sympathetic. He was a born leader, a great teacher.

The doctor married, on October 26, 1892, Miss Bettie Fleischmann, daughter of Charles Fleischmann, of Cincinnati. To the union were born three children—Carl F., Christian R. III, and Julius F.

Three months before his decease, Dr. Holmes was stricken with appendicitis, and, tho not in a condition

favorable to recovery, he was nevertheless obliged by the urgent symptoms of his case to submit to an operation. There developed sequellae, from which he ultimately died, at the Post-Graduate Hospital, in New York City, January 9, 1920.

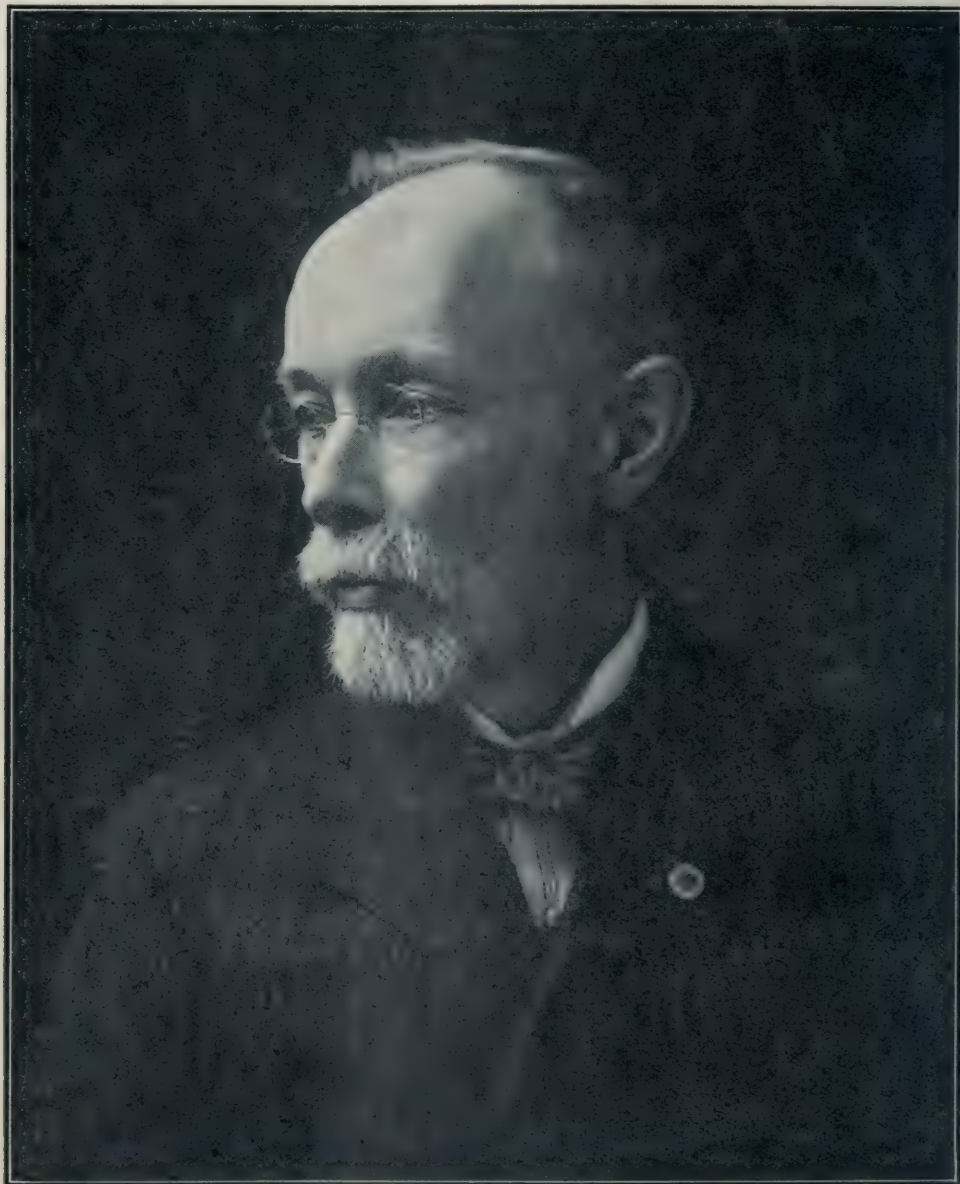
Of the very remarkable personality of Dr. Christian Holmes, there should be a fitting record. Said James A. Green, of Cincinnati: "He was a man of marvelous visions, which he promptly translated into facts." Said the Journal of the American Medical Association: "Dr. Holmes was an idealist and enthusiast, and worked with untiring energy, sacrificing health and fortune to the accomplishment of the great plans which he had conceived."

Dr. Holmes's contributions to medical literature are numerous. Among the more important we may mention the following: Modern Hospitals, with Special Reference to Our New Municipal Hospital and its Relation to Medical Education in Cincinnati (Cincinnati, 1908); Cincinnati General Hospital, Its History and Present Aspect (Modern Hosp., 1919, v. 13, p. 161); Extirpation of the Lachrimal Gland in Epiphora; Mastoid Cases at Camp Sherman; Daniel Drake's Memorial Address; The Relation of Pathological Changes in the Accessory Nasal Cavities to Diseases of the Eye. Shortly before his death, Dr. Holmes was engaged upon a book relating to the Accessory Nasal Sinuses and Their Pathologic Relations to the Eye, which was to have been a volume of the series known as "The International System of Ophthalmic Practice."

CHARLES MCINTIRE, a well known American ophthalmologist, long secretary of the American Academy of Medicine, was born in Philadelphia, August 30, 1847, son of Charles and Eliza (Cook) McIntire; he was descended on the maternal side from English, on the paternal, from Scotch-Irish and English-Quaker ancestry. He was graduated from the Easton High School in 1864, and received the degree of A. B. (*cum laude*) at Lafayette College in 1868, and that of A. M. in 1871. From 1868 to 1872 he was as-

sistant in chemistry at his alma mater, and adjunct professor from 1872 to 1874. His medical degree having been received at the University of Pennsyl-

In 1882 he was appointed lecturer on hygiene at Lafayette College, and from 1884 to 1888 was medical director of physical training at the same institu-



Charles McIntire, 1847-1920

vania in 1873, he engaged in general practice at Easton, Pa., and later restricted his practice to the eye, ear, nose and throat.

tion. For a time he was medical inspector of the Pennsylvania State Board of Health. He was an associate member of the American Institute of

Mining Engineers from 1872 to 1878, of the American Chemical Society from 1876 to 1880; secretary of the Northampton County Medical Society from 1876 to 1898, and its president in 1899; secretary of the Lehigh Valley Medical Association for several years; associate secretary of the Pennsylvania State Medical Society in 1874 (became a permanent member of that body in 1876); associate secretary of the American Academy of Medicine from 1878 to 1889, secretary from 1890 to 1902, president from 1902 to 1903, again secretary from 1903 to 1915, and treasurer in 1915, associate member of the National Confederation of State Medical Examining and Licensing Boards in 1896, a Fellow of the American Medical Association, a member of the Phi Beta Kappa fraternity, and of the American Association for the Advancement of Science. In 1915, he resigned, because of failing health, his secretaryship of the American Academy of Medicine—a position he has filled with very remarkable patience and ability.

Dr. McIntire was a small, spare man, with a waxen complexion, light blue eyes, and thin, white hair. He wore as a rule, a full, close-cropped, beard. He was gentle and tactful in his manner, and a man of rare executive ability.

He married, May 19, 1881, Ella, daughter of Dr. Traill Green, of Easton, Penna. They had no children. About eight years ago Dr. McIntire fractured one of his legs, and later developed osteitis deformans, from which he died, January 4, 1920. He was a member of the First Presbyterian Church, of Easton, in which he had been a ruling elder for many years.

Dr. McIntire was a prolific contributor to chemical and medical journals, most of his articles dealing with hygiene, medical economics, and sociology. He was editor of the Lehigh Valley Medical Association Journal, and of the Bulletin of the American Academy of Medicine.

FRANCIS REBER MUSSER, an ophthalmologist of Oakland, Calif. Born in Pennsylvania in 1860, he received the medical degree at the University of

Pennsylvania in 1895. He seems to have settled soon afterward at Oakland as ophthalmologist and oto-laryngologist. His death occurred from paralysis at Oakland, August 26, 1919.

ARTHUR BRIGHAM NORTON, a well known homeopathic ophthalmologist of New York City, author of various books on homeopathic ophthalmology,



Arthur Brigham Norton, 1856-1919

and at one time editor of the Homeopathic Eye, Ear and Throat Journal. He was born at New Marlborough, Mass., September 15, 1856, the son of Salmon Kasson, and Sarah Jane (Brigham) Norton. His preliminary training was received at the New Marlborough Academy and the Great Barrington High School. He received the degree of M. D. from the New York Homeopathic Medical College and Hospital in 1881, and that of *Oculi et Auris Chirurgus* from the College of the New York Ophthalmic Hospital in 1882. He practiced in New York City.

Dr. Norton was Professor of Ophthalmology in the New York Homeopathic Medical College and Hospital from 1902

to 1907, and in the College of the New York Ophthalmic Hospital from 1882 to 1919. He was oculist to the Hahnemann and Laura Franklin Free Hospitals; surgeon to the New York Ophthalmic Hospital; a member of the American Institute of Homeopathy; the American Homeopathic Ophthalmological, Otolological, and Laryngological Society and a Fellow of the American College of Surgeons. He contributed numerous articles to homeopathic publications, and also wrote "Ophthalmic Diseases and Therapeutics" (3d ed., 1901) and "Essentials of Diseases of the Eye" (1904).

Dr. Norton was a man of medium build, a fair complexion, and light blue eyes and brown hair. He wore as a rule a Van Dyke beard, and was always brisk and gay in manner. He was very much interested in hospital improvement.

He married, November 25, 1885, Leah Louise Pixley, by whom he had two children. His death occurred at New York City on June 18, 1919.

HENRY FOWLER STOWELL, a well-known ophthalmologist and otolaryngologist of Rochester, N. Y., was born at Hornell, N. Y., in 1848. His medical degree was received at the College of Physicians and Surgeons in the City of New York in 1877. He practiced for a time in New York City as a specialist in diseases of the eye, ear, nose and throat, and later opened an office in Rochester, retiring, however, some years ago. After his retirement, he took up the study of mechanical devices and received patents for many of his inventions, some of which are in practical use. Dr. Stowell died at the home of his daughter in Wayne, Penn., June 8, 1919.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities.

DEATHS.

Dr. William King Rogers, Columbus, aged fifty-three, died February 27th, from septicemia.

Dr. Gustav Adolph Thiede, Baltimore, aged forty-seven, died February 16th.

Dr. F. T. Reyling, Kansas City, died February 24th, 1920, of pneumonia. Dr. Reyling graduated at the University of New York in 1884 and was later Assistant Professor of Pathology and Visiting Surgeon at the Manhattan Eye and Ear Infirmary. He came to Kansas City in 1897 and practised his specialty, ophthalmology, there until his death.

PERSONALS.

Dr. J. Norman Risley of New Bedford, Massachusetts, announces John Norman Risley, Junior, born March second.

Dr. John E. Weeks of New York has retired as an Active Surgeon of the New York Eye and Ear Infirmary, and has been made Consulting Surgeon.

As a result of the competitive examination recently held by the Cook County Civil Service Commission, Drs. E. Findlay, G. F. Suker, and C. G. Darling received appointments as ophthalmologists on the staff of Cook County Hospital, Chicago.

Dr. E. Fuchs, formerly of Vienna, Austria, is now residing in Madrid, Spain, where he went on invitation of the "Junta de Ampliacion de Estudios" to deliver a course of lectures on Ocular Pathology. These lectures will be supplemented with explanations by Dr. Cajal.

Dr. George F. Keiper, of Lafayette, Indiana, has suffered the loss of his wife, Mary Lloyd Keiper, who died at her home recently of an incurable malady from which she has been seriously ill for several months.

Dr. Luther C. Peter of Philadelphia has been honored by the Council of the Oxford Congress with an invitation to open the discussion which will be held this year, on "Perimetric Methods." The Congress will

take place in Keble College, Oxford, on July 14-15-16. Dr. Peter expects to sail the latter part of June.

SOCIETIES.

The eighth annual meeting of the Pacific Coast Oto-Ophthalmological Society will be held in Portland, Oregon, during the week beginning July 26th, 1920.

At the annual meeting of the Milwaukee Oto-Ophthalmic Society, February 6th, Dr. Gustavus I. Hogue was elected president; Dr. Richard J. Muenzner, vice-president, and Dr. John E. Guy, Secretary.

Dr. Meyer Wiener, St. Louis, presented a paper on "Epithelial Inlay in Restoration of the Socket" at the February meeting of the Kansas City Eye, Ear, Nose and Throat Club. This was an all day clinical meeting.

At the March meeting of the Kansas City Eye, Ear, Nose and Throat Club, papers were presented by Drs. E. M. Seydell and J. G. Dorsey of Wichita, and Dr. J. H. Laning of Kansas City.

Dr. Arthur J. Bedell of Albany is Chairman of eye, ear, nose and throat section of the Medical Society of the State of New York, which held its one hundred and fourteenth annual meeting in New York City, on March 22nd.

At the annual meeting of the Portland Ophthalmological and Oto-laryngological Society the following officers were elected for the ensuing year: President, Dr. J. F. Beaumont, Portland; first vice-president, Dr. S. E. Wright, Portland; second vice-president, Dr. R. E. Fenton, Portland; secretary-treasurer, Dr. C. Gertrude French, The Dalles, Portland.

At the March meeting of the Chicago Ophthalmological Society papers were read by Dr. G. W. Mahoney on "Some Indications for Evisceration"; Dr. Harry Woodruff, on "Enucleation and Its Substitutes for Cosmetic Effect"; and Dr. E. F. Snyder, on

"Plastic Corrections in Slight Ectropion to Retain Glass Eye."

At the February meeting of the Section on Ophthalmology of the New York Academy of Medicine, a very instructive evening was spent in the study of Wood Alcohol poisoning with special reference to the eyes. The subject was handled by Colman W. Cutler, Charles Norris, Professor Charles Baskerville and Professor Joseph P. Chamberlain.

At the March meeting, the physiologic properties of the lens and their application in measuring refraction was presented by Walter B. Lancaster of Boston, and "The Optics of the Cornea," by G. W. Vandegrift.

MISCELLANEOUS.

We made an error last month in stating that the Archives d'Ophtalmologie had been discontinued during the period of the war. This journal appeared regularly.

As a result of the campaign being carried on by the Illinois Society for the Prevention of Blindness, two Chicago midwives were recently made to pay fines of \$25.00 and \$15.00 for neglecting to use nitrat of silver in the eyes of new born babies.

A free diagnostic clinic has been established in Buffalo, designed primarily for the use of physicians' pay patients, who cannot afford the customary consultation fee. No treatment will be given. Dr. E. G. Starr has been appointed ophthalmologist on the staff.

An Associated Press dispatch, dated last December, mentions a new concave screen that gives depth to the picture, and relieves eye strain. Dr. Louis Pech of the University of Montpellier, France, the inventor, supervised the exhibition in this country. Dr. Pech believes the relief from eye strain is due to the normal functioning of the eye when it sees things of three dimensions, even if the appearance of the third dimension is illusion.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colo.

DIAGNOSIS.

- Baslini, C.** Simple Corneal Microscope. *Osp. Maggiore*, v. 7, p. 73.
- Clarke, E.** Vision of Aviators. *Tr. Ophth. Soc. United Kingdom*, v. 39, p. 54.
- Dimitry, T. J.** Examination of Eyes as Factor in Diagnosis. *New Orleans Med. and Surg. Jour.*, Feb., 1920.
- Duverger, C., and Barré, J. A.** Arterial Retinal Tension. (2 ill.) *Arch. d'Ophth.*, v. 36, pp. 71-88.
- Examination of Eyes as Factor in Diagnosis. *New York Med. Jour.*, v. 111, p. 378.
- Hay, P. J.** New Test Types Including Colored Test Types and Their Application to Toxic Amblyopia. (1 chart.) *Tr. Ophth. Soc. United Kingdom*, v. 39, pp. 240-246.
- Kern, v. B.** New Test Chart. *Berl. klin. Woch.*, v. 56, p. 1002.
- Koby, E. E.** Ophthalmoscopy of Normal Eye with Light Devoid of Red Rays. (1 col. pl.) *Rev. Gen. d'Ophth.*, v. 34, pp. 6-16.
- Smith, H. E.** Relationship of Ophthalmology to Group Diagnosis. *New York Med. Jour.*, v. 111, pp. 357-358.
- Velter, E.** Measurement of Arterial Tension. *Arch. d'Ophth.*, v. 36, pp. 88-95.

THERAPEUTICS.

- Netto, C.** Heat in Ocular Therapeutics. *Arch. Brazil de Méd.*, v. 9, p. 504.
- Roberts, B. H. St. C.** Sera and Vaccines in Eye Work. *Tr. Ophth. Soc. United Kingdom*, v. 39, pp. 361-366.
- Urrea, F. M.** Prolonged Use of High Frequency Current in Ocular Disease. *Arch. de Oft. Hisp.-Amer.*, v. 19, p. 653.

OPERATIONS.

- Guglianetti, L.** New Synechiotome. (2 ill.) *Arch. di Ottal.*, v. 26, pp. 235-240.
- Mayou, M. S.** Method of Iridectomy. *Brit. Jour. Ophth.*, v. 4, pp. 124-125.
- Weekers, L.** Amphitheatre for Ocular Surgery. (1 ill.) *Arch. d'Ophth.*, v. 36, pp. 34-37.

REFRACTION.

- Beckers, H.** Myopia. *Excerpta Med.*, v. 28, p. 225.
- Chattaway, F. D.** Optical Activity. *Science Prog.*, v. 14, p. 243.
- Clarke, E.** Presbyopia. (3 ill.) *Tr. Ophth. Soc. United Kingdom*, v. 39, pp. 246-258.

- Dinger, J. E.** Genesis of Myopia. Graefe's *Arch. f. Ophth.*, v. 100, Ht. 1-2. *Abst. Berl. klin. Woch.*, v. 56, p. 1028. *Wien. med. Woch.*, v. 48, p. 2362.
- Ellett, E. C.** Headaches Due to Eye Strain. *Jour. Tenn. State Med. Assn.*, v. 12, p. 382.
- Faber, O.** Ferraris' Dioptric Instruments, an Elementary Exposition of Gauss' Theory and its Application. *Brit. Jour. Ophth.*, v. 4, p. 140.
- Fehr.** Testing for Eyeglasses. *Therap. der Gegenwart*, v. 60, p. 377. *Abst. J. A. M. A.*, v. 74, p. 639.
- Haughey, I. W.** Practical Observations on Refraction. *Amer. Jour. Ophth.*, v. 3, p. 197.
- Lang, B. T.** Position and Amount of Astigmatism. *Brit. Jour. Ophth.*, v. 4, p. 126.
- Sharp, W. N.** Headaches due to Eye Strain. *Indianapolis Med. Jour.*, v. 23, p. 62.
- Sumner, P.** Refraction and Medicine. *California State Jour. Med.*, v. 18, pp. 78-82.
- Uthhoff, W.** High Myopia and Ocular Muscle Paralysis. *Klin. M. f. Augenh.*, July-August. *Abst. Berl. klin. Woch.*, v. 56, p. 1027.
- Wibaut, F.** Refraction in Semidarkness. *Nederl. Tijdschr. v. Geneesk.*, v. 2, p. 1437. *Abst. Jour. A. M. A.*, v. 74, p. 708.

OCULAR MOVEMENTS.

- Bilancioni and Manóia.** Spontaneous Nystagmus in Aviators. *Policlin.*, v. 26, p. 461. *Abst. Jour. A. M. A.*, v. 74, p. 565.
- Butler, T. H.** Stereoscopic Vision. *Tr. Ophth. Soc. United Kingdom*, v. 39, p. 52.
- Craig, J. A.** Case of Squint. *Tr. Ophth. Soc. United Kingdom*, v. 39, pp. 383-386.
- Davids, H.** Strabismus and Double Vision. *Klin. M. f. Augenh.*, v. 63, July-August. *Abst. Berl. klin. Woch.*, v. 56, p. 1027.
- Dusser de Barenne, J. G.** Caloric and Turning Nystagmus. *Nederl. Tijdschr. v. Geneesk.*, 1919, 1, p. 2243.
- Duverger and Mettey.** Advancement for Strabismus. *Médecine, Paris*, v. 1, p. 200.
- Griffith, C. R.** Effect of Repeated Rotation upon Nystagmus. *Laryngoscope*, v. 30, p. 22.
- Hoeve, van der, J.** Tonic Labyrinth Reflex of Eyes. *Arch. f. d. ges. Physiol.*, v. 159, pp. 1-81.

- Kirschmann, A. Binocular and Stereoscopic Vision. *Psychol. Studien*, v. 10, pp. 239 and 381.
- Miners' Nystagmus. *Brit. Jour. Ophth.*, v. 4, p. 129.
- Terrien, F. Orthoptic Treatment of Strabismus without Instruments or Prisms. (4 ill.) *Arch. d'Ophth.*, v. 36, pp. 37-42.
- Velter and Wiart. Traumatic Bilateral External Ophthalmoplegia. *Rev. Neurol.*, 1919, No. 7. *Abst. Rev. Gen. d'Ophth.*, v. 34, p. 47.
- Walter, W. Heterophoria and Heterotropia. *Amer. Jour. Ophth.*, v. 3, p. 201.
- Weekers, L. Alterations in Twilight Vision in Occupational Nystagmus. *Amer. Jour. Ophth.*, v. 3, p. 162.
- Werner, H. Optical Rhythm. *Arch. f. d. Ges. Psychol.*, v. 38, p. 959.
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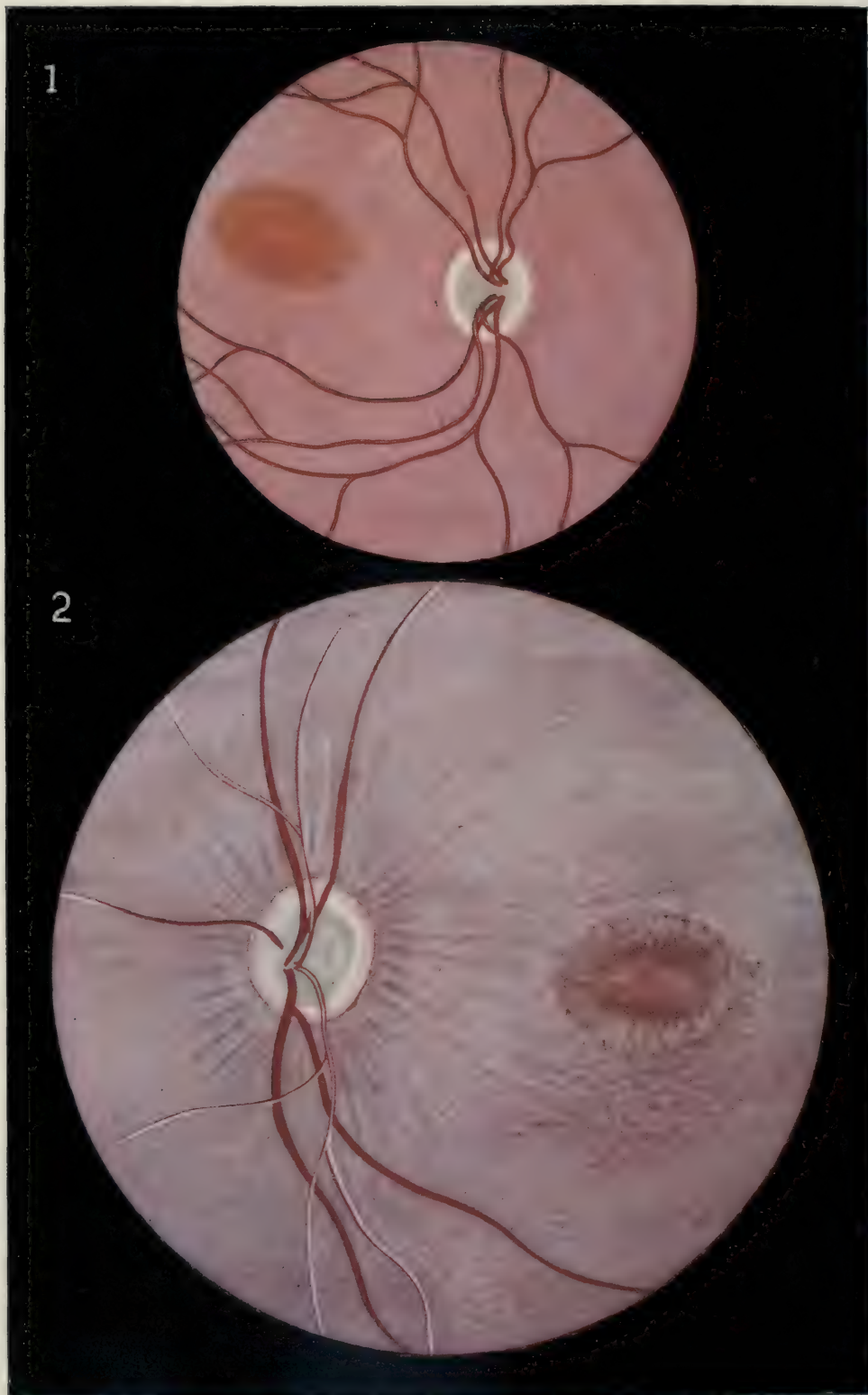
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220



THE OCULAR FUNDUS AFTER DEATH. (WÜRDEMANN)

1. FUNDUS C. R. C. ABOUT THIRTY MINUTES AFTER DEATH.
2. FUNDUS J. E. F. ABOUT FOUR HOURS AFTER DEATH.

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THE FUNDUS OF THE EYE AFTER DEATH.

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This paper reviews the ocular signs of death and reports especially the ophthalmoscopic changes observed in recent army service.

There has been little added to the literature of the ocular signs of death for twenty years. The chapter on the subject by Gayet,¹ is yet the standard and most complete article on the subject. Doubtless very few of the thousands of ophthalmologists in the world have had the opportunity,—and perhaps few have had the inclination,—to look into a dead man's eye for corroboration even to their own minds, of the well established signs that this organ gives of a lethal ending.

Very few cases of death occur in the actual practice of the oculist, indeed there must be many who have never signed a death certificate. In the large majority of cases the eye surgeon in attendance is not present at the time of death, nor does he see the body afterwards; as it is the usual policy to shift the onus to the general medical man in attendance. Thus it is that the only ophthalmic surgeons who have had any amount of experience in fundus examinations on the cadaver, are those connected with large institutions, particularly with teaching faculties, such as previously existed in Europe, where the economic and psychic restrictions as to the use of the body after death by medical men, are not great, as is the case in the English speaking countries.

In the 1917 volume of U. S. A. Mortality Statistics,² just published, of the results obtained by sending 43,876 inquiries to physicians, in 1,066,711 deaths in 1917, only 97 were given as due to diseases of the eye and adnexa. It is safe to say that aside from the question of tumors, most of these were due to diseases of the adnexa.

EXTERNAL OCULAR SIGNS OF DEATH.

It may be well at this time to call to mind certain pathognomonic stigmata, which taken as a whole, are evidence of demise; the eye signs being without doubt the most pronounced and surest of all the bodily evidences of the departure of the spirit. Shastid³ gives a resumé which is acceptable; he states that signs of death relate to three periods: 1, the stage of transition; 2, the cadaveric state; 3, the state of putrefactive processes. Only the signs relating to the eyes, of course, concern us here, and further, even these chiefly in the state of transition.

He then goes on to refer to (1), the paleness of the skin of the lids, the partial opening where gradual dissolution occurs, except in cases where the disease causes edema as in drowning, or in death from sudden shock as in gunshot wounds, when the eyes may be staring and wide open. (2). The falling in of the globes which usually occurs as the patient is dying, and is always shown in the cadaveric state from rigor mortis, and the divergence or parallelism of the axes. (3). The insensibility of the conjunctiva and cornea and the film, or "the finely ruined eyes of death" from lymph which exudes from the ocular tissues, and the exfoliation of the anterior epithelium followed later by wrinkling of the cornea. (4), The lethal discoloration of the sclera from subconjunctival ecchymosis and staining with choroidal pigment. (5) The usual dilatation of the pupils at the moment of death which is followed later by contraction from the setting in of rigor mortis. It is said that the pupil re-

sponds to eserin and atropin for about an hour after death, and may react to galvanism for five hours. All these signs are of relative importance and all are apparent without special knowledge or instruments.

THE OPHTHALMOSCOPIC SIGNS OF DEATH.

The sixth sign i. e. the appearances of the fundus at the moment of death and afterwards, is the most positive and pathognomonic, and is certainly of the most value. These appearances are indubitable, and in those cases in which the media are sufficiently clear to allow of this procedure, the expert ophthalmologist should be able to give a positive opinion as to whether or not the person is really dead, and often the length of time since his demise.

The author has had the opportunity to make fundus examinations in a dozen or more cases, and despite this gruesome task, has been interested in corroborating the observations of others. He seized this chance during his recent army service for the purpose of making ophthalmoscopic pictures, two of which, with the brief case histories, are included with this article.

We find by the ophthalmoscope that about three hours after death the media have become somewhat obscured from a lethal film, due to the exudate of albumin, and to disintegration of the corneal epithelium, whereby the mirror reflection from the cornea does not occur, and the images of Purkinje are not seen. As a rule this film forms at the time of death or shortly afterward. That on the cornea may be wiped away, and if a little fluid be put in the eye, the examination may proceed. The reflections may then be seen up to about five hours; this sign is of little consequence.

The main observations relating to the condition of the fundus are alterations, at first due to the cessation of the circulation. The most pronounced and pathognomonic sign is certainly the yellowish discoloration of the fundus, due to the slowing of the heart beat; and the heart may beat for several minutes after actual death. The fundus becomes a sickly yellow, the

nerve head blanches and usually the arteries become straighter and less filled with blood.

This condition obtains for a quarter to one-half hour, when changes in the blood occur: the arteries become more empty and may even seem to disappear; and the veins are reduced to small, irregular and filamentous lines. The blood current stops altogether owing to coagulation, and shortly afterwards clear spaces filled with serum appear between the blood clots. Finally, after four or five hours, transudation of the blood pigment occurs, when the arteries are scarcely to be seen. The veins persist for a much longer time, and in fact blood may be found in them twenty-four hours after death. But even here clear spaces will be seen in their lumen, and the smaller vessels cannot be distinguished. The yellowish discoloration gradually becomes dirty and then brownish-gray, due to infiltration and disorganization of the retina, which finally hides the choroid, so that if the choroidal vessels had been seen in life, they cannot be observed thru the increasing opaqueness of this membrane.

The disc likewise passes in color from a pinkish white to yellowish green and then to a slaty appearance; its edges are not well defined, all due to the want of blood in the capillary vessels and to increasing tumefaction of the tissues.

To my knowledge there is only one colored plate in the literature showing their appearance,—that of Bouchut⁴; they were so well marked in the two cases presented here, it is deemed advisable to recall them in a more modern essay.

CASE 1.—C. Chas. R., Pvt., Hdqs. Co., 44th Inf. Age 30. Service 12 mos. Admitted to Hospital Nov. 12, 1918, with measles; broncho-pneumonia; secondary otitis media R and L; mastoiditis left; mastoid operation January, 1919. Ether given, patient did not take it well. Died fifty minutes after 1st administration. Board of investigation instituted. Fundus examined thirty minutes after apparent death (1 Plate IV). The vessels are

smaller than in life. The blood has not yet coagulated so their lumina were full. The color was the same in arteries as in veins. This may be pathognomonic of death under ether. The general color is darker than in life, but not so ghostly pale as in Fig. 2, which was drawn some time after death from another subject.

CASE 2.—F., Jno. E., Pvt., 32. Co. 166 B. B. Age 29, December 26, 1918. Postmortem ophthalmoscopic picture about four hours after death with epileptiform seizure. Fundus

found normal twenty hours before, altho the patient had syphilitic gumma of left anterior lobe of brain. The blood having drained from the choroidal vessels and most of the retinal vessels, the fundus is uniformly slaty gray, and the veins somewhat contracted carrying dark blood. The arteries are nearly empty, greatly reduced in size and are of the same color, where blood has adhered to their lumina. No small blood vessels are seen. The disk is discolored. The macular area shows distinctly. (See 2 Plate IV.)

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OCULAR LESIONS CAUSED BY ASPHYXIATING GASES.

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As Reserve Physician in the Belgian Army Dr. Danis had to study and treat the effects produced on the eye in gas warfare. This paper briefly summarizes the results of his observations. Translated by Dr. M. W. Fredrick.

I have had numerous occasions of observing the effects produced on the ocular apparatus by the so-called asphyxiating gases used by the Germans in the recent war, and to view these effects very soon after their production.

Two kinds of gas act principally upon the ocular apparatus: the tear producing and the blistering gases.

TEAR PRODUCING (LACRIMATORY) GASES.

The products most often employed are: chlorin, bromin, methyl monochlorid chloroform, or pallite, methyl bichlorid chloroform, or surpallite, acrolein, acetone bromoform, methyl acetone bromoform, benzyl bromat, benzyl iodid, phenyldichlorarsin, and diphenylchlorarsin.

SYMPTOMATOLOGY.—The effect of these different agents on the eyes is practically the same. The soldiers have a sensation of itching, or even of burning; tearing, blepharospasm and photophobia are intense, so much so in some cases that the men are incapa-

ble of finding their way about unaided. Under these conditions the wearing of the antigas mask is almost impossible. The bulbar and palpebral conjunctivae are strongly hyperemic, but there is no ciliary injection, and corneal lesions have never been observed.

These symptoms present themselves immediately after the gas attack, and disappear within a few days, leaving no traces.

PROGNOSIS.—As far as the eye is concerned the lesions produced by lacrimatory gases are benign.

BLISTERING GASES.

The blistering gas most often used is the "mustard gas," so called on account of its odor, or Yperite; because it was used by the Germans for the first time in the Ypres sector. This gas is dichlorethylsulphid, a liquid with a high boiling point, which is used in projectiles only. The liquid may come in direct contact with the soldier

immediately after the explosion of the shell, or it may reach him later on by contact, or by evaporation from the ground, clothing, the trenches, the shelters, or shell holes.

SYMPTOMATOLOGY.—There are no immediate consequences, but in five or six hours after exposure the first eye symptoms appear, and attain their height eighteen to thirty-six hours later. The lesions consist of conjunctival and ciliary injection, which always precedes the blepharospasm and photophobia. These two latter symptoms may be so violent as to preclude the examination of the ocular globe. This hyperemia is, in the beginning, localised in the parts normally exposed to the air thru the lid aperture.

Often the corneal epithelium shows a slight lesion in the region corresponding to the lid aperture. This lesion is so slight in some cases that an examination with fluorescein and the loupe are necessary to discover it. In other cases the cornea presents a general clouding. Deep and extensive ulcers have been reported, but I have never seen them. The ciliary injection occurs very often, and in these cases there is contraction of the pupil. This ciliary injection is a concomitant of the corneal lesions.

The conjunctival secretion may appear after several days and be rather profuse, but it never contains any microbial elements. The examination of the fundus is rendered difficult by the blepharospasm and photophobia. But in those cases which I was able to examine I have never found any lesions of the deeper parts or of the media.

Burns of the eyelids may occur just as burns of other parts of the body. These burns are generally found on those parts of the body which are normally moist: axilla, genital organs, eyelids moistened by tears, etc.; they are mostly of the first or second degree.

Altho not serious these lesions are

difficult of management and slow in healing; as an average two months are required to effect a cure.

PROGNOSIS.—Generally speaking the prognosis in burns by Yperite is benign. A serious complication is corneal ulceration followed by nebula or leucoma.

TREATMENT.—It has been recommended that at the dressing stations the eyes be flooded with a solution of potassium permanganat. But this is a difficult procedure on the first or second line; and those who have advised this have never witnessed the work of a battalion doctor during action, when the station is crowded with wounded and gassed soldiers.

The instillation of one or two drops of an alkalin solution, for instance of a two per cent solution of sodium bicarbonat, is easily done; and is more aseptic and more effective because it penetrates better into the conjunctival folds. In the division hospital to which I was attached the wounded were received and put in darkened places, and another instillation of an alkalin solution was made. To prevent conjunctival infections, generous washing of the eyes with one quarter of one per cent of potassium permanganat was practised several times a day. For pain cocain and adrenalin drops were used five or six times a day, and atropin was used to overcome the congestion of the iris. When the blepharospasm had disappeared smoked glasses were worn. Astringent collyria, such as zinc, tannin, nitrat of silver, are to be avoided. In corneal desquamation the indications are the use of atropin and of a cicatrising ointment, such as biniodothymol. As to the burns of the eyelids they are to be treated according to the usual methods.

PROPHYLAXIS.—All the masks in actual use in the Belgian army (M 2, A.R.S., and Tissot), if well applied, completely protected the eyes against the vesicating action of Yperite.

REMOVAL OF STEEL FROM THE EYE FROM AN INDUSTRIAL STANDPOINT.

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This series of recent cases of magnet extraction and alternative treatment was read and discussed before the Section on Ophthalmology and Otology of the Baltimore City Medical Society. See page 137.

It is not my intention in bringing this subject before you to advocate anything new or startling but to add our bit of testimony, and to record some of our viewpoints which have changed somewhat since the subject was last discussed before this Section; and secondly to try to prove that this is not a hopeless condition as I have heard some of my colleagues express the opinion rather recently.

It is interesting in reviewing the history to find that Dixon of London in 1859 drew a fragment of scissors from the vitreous to an incision in the sclerotic, then removed it by forceps. This was followed by McKeown in 1874, and Hirschberg in 1877 who used the electromagnet, consisting of a soft iron bar wrapped with copper wire. Haab presented his giant magnet in 1892, it being the largest and most powerful at that time.

In this country Gruening, Hubbell, Johnson, Lippincott, Sweet, Parker and others have devised magnets. Williams, of Boston, was the first to use the X-ray for diagnosis and localization in 1896.

The chief point in discussion at the present time seems to be as to the relative desirability of using the anterior method of extraction, as advocated by Haab; or the posterior route as championed by Sweet, de Schweinitz and others. Our experience up until a few years ago made us rather favor the anterior method, more recently it has changed somewhat, and relatively speaking I would prefer the posterior route. Of course, there can be no hard and fast rule, but all cases are to be handled individually; and in case of recent injury, with the F.B. in close proximity to, or even in the wound of entrance, immediate extraction thru the wound is preferable.

As shown by the table, several of these cases are of considerable interest; as in Case 29, the very large size of F.B., $9 \times 5 \times 2$ mm. Its location in the ciliary region, and the extraction thru the wound, and good visual result, 20/20.

Case 13 was diagnosed chiefly by a small point of siderosis, and confirmed by X-ray. Extracted after three years, and after removal of cataract V. = 20/50.

Case 9, with 3/200 V. and getting worse, improved to 20/20, without cataract.

Case 8; injury unknown, negative to X-ray. Minute F.B. $1 \times \frac{1}{2} \times \frac{1}{2}$ mm. 20/20 vision with + 13.00 sphere.

4 cases had normal vision = 14%.

6 aphakic eyes, with V. 20/50 to 20/20 = 21%.

10 useful vision = 35%.

7 light perception to motion = 24%.

11 eyes lost = 38%.

1 vision not tabulated.

This compares very favorably with Bull's report in 1902 of eighteen cases without a single case of useful vision; and comparatively well with Sweet's last series which showed useful vision in 24% of the cases and 51% lost eyes.

Seven cases were operated on by the posterior route, five cases retaining useful vision, or 71%.

Sixteen times the injury occurred in the right eye, and twelve times in the left.

Average size of F.B. was $4.8 \times 2 \times 1$ mm.

Largest was $20 \times 5 \times 4$ mm.

Smallest $1 \times \frac{1}{2} \times \frac{1}{2}$ mm.

Average age 34.

Youngest 17.

Oldest 53.

While this series is not large I believe it demonstrates that at least not all of these cases are hopeless, and that

TABLE OF CASES.

No.	Age	Date	Injury	Operation.	Result.	Size.
(1) A. E.	34	4/23/19	R. Injury 4/8/19. Scar nasal side of cornea. Hole in iris, F. B. on post surface below nerve, with oph. V=20/70.	Incision between internal and inferior rectus. Magnet.	5/4/19 V=20/50 Opacity in lens. 5/17/19 V=20/200	1x3/4x1/2 mm.
(2) H. H.		10/4/14	L. No history of wound. Has only one eye.	Magnet.	Panophthalmitis. Lost eye.	Large. 10x4x2 mm.
(3) C. J.	28		R. Wound near center of cornea. Cut of sphincter of iris.	Post. incision between superior and External rectus. Magnet.	Traumatic cataract. Absorbing.	3/4x1/2x1/4 mm.
(4) J. K.		9/15/13	L. Wound in sclerotic Hypphemia.	Enlargment of incision opening; Anterior Chamber. Magnet.	No tabulation.	12x2x1 mm.
(5) G. K.	19	11/13/14	R. Cut of Cornea.	Magnet over wound. Iridectomy.	Cataract needling. No. V. result recorded.	6x1 1/2x1 1/2 mm.
(6) W. T. M.	38	3/28/16	L. Cut of cornea, prolapsed iris. Cataract.	Magnet over wound. Iridectomy.	Pthisis Bulbi.	7x3x1 1/2 mm.
(7) E. F. F.	28	5/8/16	Injury 5/13/16. Seen 5/18/16, scar at temporal margin. R. cornea.	Post. incision Ext. and Sup. rectus. Magnet.	Steel removed 3/19/18. Traumatic cataract needed. V=R s. + 12. Cyl. ax. 90°=20/20-	4 1/4x1x1 1/2 mm.
(8) H. C. C.	21	7/28/19	L. Steel in lens, macula of cornea. X-ray negative.	Spade knife Magnet. Removed lens.	L. + 13.00-20/20.	1x1 1/2x1 1/2 mm.
(9) C. C. S.	47	7/6/18	R. Injured 6/25/19; seen first 7/6/18. Said to have been advised to leave alone. V=3/200.	Post. incision between Inf. and Ext. rectus. Magnet extraction.	Vitreous opacities absorbed. V 8/8/18=20/20.	2x1x1 1/2 mm.
(10) L. E. C.	37	4/3/11	L. Wound in lower temporal quadrant cornea. Steel in lens.	Magnet extraction through wound.	Irido-cyclitis.	7x1 1/2x1 1/2 mm.
(11) N. O. D.	33	12/28/17	R. Injured 10/9/17. Eye painful. 12/23/17 pus in ant. chamber.	Post. extraction incision between Ext. and Inf. rectus.	Eye continued painful and was enucleated.	Small.
(12) J. F.	38	11/13/18	L. O. S. Wound of cornea and iris.	Magnet applied over injury. No results. Incision between Ext. and Inf. recti; removed.	Irido-cyclitis. Enucleation.	3x2x1 mm.
(13) B. M.	23	6/18/15	R. Injury three years previous. Macula cornea; traumatic cataract; F. B. vitreous.	Post. incision. Ext. and Inf. rectus; magnet extraction; extracted cataract.	V=s. + 12.00 = 10/200. 2/1/18 V=+12.00 = 20/50-	2x1 1/2x1 mm.
(14) J. B.	35	10/10/15	L. Wound temporal limbus; prolapse of iris; hyphemia; vitreous humor. V=Motion	Magnet extraction from iridectomy.	Irido-cyclitis. Enucleation.	2 1/2x2x1 mm.
(15) J. L.		4/21/19	R. Steel imbedded in sclerotic between Ext. and Inf. rectus.	Removed with forceps; some loss of vitreous.	V=20/15	5x1x1 1/2 mm.
(16) L. R.	28	8/2/19	L. Center of cornea. F. B. in vitreous.	Cornea incision, iridectomy, magnet extraction.	Traumatic cataract extraction. V=+10 Cyl. ax. 160° = 20/40++	2 1/2x1 1/2x1 1/2 mm.
(17) B. S.	46	3/15/18	R. Lower outer quadrant cornea. Cut of iris. Steel in vitreous.	Corneal incision, extraction with magnet. Traumatic cataract.	Refused operation. V=L. P.	3x1 1/2x1 mm.
(18) J. A.	?	4/23/18	Steel in anterior chamber. R. on iris, lower nasal quadrant.	Corneal incision, magnet. No iridectomy.	Little reaction. Did not see after leaving hospital.	1x1 1/2x1 1/2 mm.
(19) I. C.	17	6/13/13	R. One mm. from limbus in cornea on temporal side. Hole in iris. F. B. seen in vitreous.	Magnet, original opening.	6/30/13 V=+1.50 Cyl. ax. 180° = 20/30. 12/3/13 V=2/200 Needed lens, 11/14/14 V +12.00 = 20/20-	3 1/4x2 1/4x3/4 mm.
I. (20)		3/24/05	Steel in vitreous.	Magnet.	Lost eye.	20x5x4 mm.

No.	Age	Date	Injury	Operation.	Result.	Size.
(21) G. R.	32	12/22/15	L. Wound of cornea; out of iris. X-ray F. B. in sclerotic.	Repeated magnet.	Lost eye.	4x3x1 mm.
(22) E. W.	51	3/19/17	Macula, L. cornea and iris, cataract. X-ray shows shadow.	Extracted lens. Tried magnet; no result.	X-ray shows no shadow. V = +4.00 - +10.00 cyl. ax. 25° = 20/50.	
(23) B. W.	24		L. Wound nasal side of sclera. Lens cloudy. steel removed by Dr. McConachie.	Removed lens. Eye lost.	F. B. embedded in sclerotic.	2x2x1 mm.
(24) L. T.	53	7/14/05	R. Wound nasal side of sclera. Lens cloudy. steel removed by Dr. McConachie.	Removed lens. Eye lost.	Enucleation.	
(25) C. G. S.	36	8/1/19	L. Wound of cornea and sclerotic.	Extraction thru wound.	Irido-cyclitis. Motion.	10x3x4 mm.
(26) P. M.	30	8/23/19	L.	Post. magnet. Ext. and Inf. rectus.	Motion, vitreous, cloudy.	3x2x1 mm.
(27) M. P.	38	1/21/18	R. Center of cornea, cut, cataract.	Repeated magnet, with negative results.	Cataract needling. Light perception.	
(28) G. W.	20	4/15/17	R. Wound of iris above with F. B. in wound.	Incision of cornea. Small iridectomy.	V = 20/30	3½x1x½ mm.
(29) A. B.	49	5/23/18	R. O. D. One mm. from limbus in cornea on temp. side. Hole in iris; F. B. seen in vitreous.	Magnet incision of ciliary body. Conj. suture.	V = c + 0.75 cyl. ax. 90° = 20/20, 9/23/18.	9x5x2 mm.

an attempt should be made to remove every particle of steel if it is lodged within the eyeball. If the eye is lost we advise enucleation, and especially so if the eye still harbors a foreign body.

We are aware that Col. Lister established very definite rules for extraction by the anterior route, for those cases occurring in the B.E.F.; but certainly

our cases of posterior extraction were more satisfactory than those removed by the anterior route, and in none of our cases did we experience the troublesome detachments reported by some. On the other hand this class of cases can not be handled dogmatically, but each case should be carefully studied with the exercise of one's best surgical judgment.

FUNGUS CONCRETION IN LACRIMAL CANALICULUS (STREPTOTHRICOSIS, ACTINOMYCOSIS.)

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One of these rare cases is here reported with review of the previous literature and the difficulties of cultivating and classifying the fungus in question. Read by invitation before the Pacific Coast Oto-Ophthalmic Society, August 5th, 1919.

There are probably some 70 odd cases recorded in the literature of concretion in the lacrimal canaliculi. Only four of these, so far as I have been able to ascertain, belong to North America, all the rest to Europe. In over ten years of clinical work as instructor in the University of California Medical Department, no instance of this condition was met with. Shortly afterwards I came upon the case here reported.

A woman of 40 years presented herself, October, 1912, for a smooth, half rounded, cylindriceddish, resistant, painless prominence, the size of a small bean; about 3.75 by 1.75 mm., situated over the central portion of the course of one lower canaliculus. There is no discharge from the corresponding punctum on pressure. The affection, of slow continuous growth, has been noticed for more than a year. Patient

has had eye drops prescribed for it by several men. To any one having knowledge of organic concretions occurring in the canaliculi the very presence of the little lump is suggestive.

By slitting the canaliculus in the usual manner with a Weber's knife, a dirty, dark greenish, slightly moist, coherent and nonadherent mass was easily removed therefrom in toto; the canaliculus being there somewhat dilated. The incision healed promptly. The small irregularly rounded substance, the size of a small pea, was easily broken up, by slight pressure between the fingers, into several polygonal bodies with smooth facets after the manner of gall stones. Smears from these proved negative regarding bacteria. Unfortunately, no suitable media being obtainable, cultures were not made. Under the microscope the matter showed a dense uniform network of long mycelial growths, with branches and often enlarged endings. Diagnosis—streptothrix.

I here subjoin the report of Dr. Ernst A. Victors, to whom a large part of the mass had been handed: "Plug from canaliculus, made up of a mass of mycelial network in homogeneous matrix, these are in true branches and end in enlarged extremities rather than in hyphae. Gram positive. No sporangium present, and endoplasm contains spores. Endoplasm encased in tubular sheath. This is not septate. Diagnosis,—mold, of the *Hyphomyceta* family. Type, streptothrix. I have not been able to make out subclassification, but it is probably *bovis communis* (actinomycosis)."

Dr. Victor's and my judgment are then agreed on the character of the mold as belonging to streptothrix. The importance of making cultures, however, will become sufficiently apparent, I hope, further on.

The earlier records of this condition are by Cesoni (1670), Sanifors (1779) and Desmarres (1842). It was von Graefe (1) who in 1854, first recognized the organic nature of the mass and who drew a classical picture of its clinical appearance based on ten cases of his own. This description has been

added to since, but has not been altered in the main.

The affection has been met with more commonly in women and, with eleven exceptions, only in the lower canaliculus. The theory of being an occupational disease (agriculture) has not become definitely established. Koster, (2) whose report in 1916 on three cases, all in women, and which I believe, is the latest in the literature, also states expressly that none of these patients had ever followed an occupation supposed to render one prone to the disease. Of the mode of its beginning we have no knowledge. Von Graefe observed that the concretions are apt to be denser and smoother toward the punctum, also being there of a darker and more uniform color, i. e. from a dark gray yellow to greenish as against a brighter varying yellow farther away. From this, he argues, we may perhaps conclude that the spores enter from the conjunctiva and the parts nearest the punctum are the oldest. The supposition that the mold is carried upon or preceded by an awn of grain, etc., which, by lodging in the canaliculus or by vulnerating its wall, would establish the beginning of the concretion, has never been proven. Goldzieher (3) has found in one instance an "eyelash in the midst of the concretion, and Schroeder (4) raises the question whether after all, this might not have been an awn. It certainly is remarkable that the spores, if merely sucked into the punctum by themselves, should not be washed out of the canaliculus with the normal flow of tear fluid.

Further, it is very striking that tho the mucous membrane of the inflamed canaliculus is much stretched, its continuity is quite intact and the mass not adherent to its surroundings. There is only one single case recorded in which a loose connection with the walls could be demonstrated (Schroeder, 4).

It is well here to mention the history (Mitvalsky, 5) of a woman, age 65, who having suffered repeatedly from a relapsing dacryophlegmon of both sides with fistula, presented herself with new swelling of left tear sac of

some months' duration. Mitvalsky removed from the sac a dark greenish mass of about almond size. Diagnosis, actinomycosis.

We read in one history (Blessig, 6) that the growth was observed in the course of a peculiar conjunctivitis with milky, sticky secretion, first in one canaliculus, and some months later, after an apparent complete cure, in the other canaliculus of the same eye. The author believes, therefore, that the spores enter from the conjunctiva. Unfortunately, he does not state whether there were any suspicious mycelia, etc., in the conjunctival secretion. There is yet another history (Kastalsky, 7) where, after removal of a concretion from a lower canaliculus, a new one was found after 20 months in the upper of the same eye. In one single instance (Snegirev, 8) concretions were found in all four canaliculi at the same time.

The growth, clinically observed as large as a hazel-nut, but generally much smaller, does not necessarily obliterate the continuity of the canal completely, and it may be possible to wash fluid thru the tear passage from the canaliculus. According to von Graefe, one may be able to palpate along the canaliculus an induration occupying the thickness of the lid, nearly cylindric, solid and but moderately compressible. Anatomically the contents may be found to consist of several bodies instead of but a single one. Accompanying symptoms in the earlier stages are irritation in the neighborhood, such as reddening of caruncle, lower plica semilunaris, canaliculus and conjunctiva covering lid margin, and subjectively those of an angular catarrh, and later a slight partial ectropium and blennorrhoea of the canaliculus with marked irritative swelling of adjacent parts. It is only within more recent years that in two instances, for the first time, purulent ulcerous affections of the contiguous tissues have been observed.

In the one case (Zur Nedden, 9) a chalazion-like prominence on the lower lid presented itself, on eversion, as semispherical with pus shining thru in

parts. In introducing a Weber's knife into the canaliculus resistance was met with so that the resulting slitting was but incomplete. It was found that the canaliculus was in communication with the purulent thickening of the lower lid. After the incision a small quantity of whitish thick pus escaped containing small granular concretions. The rest was easily scraped off. Healing was complete in 8 days. The aerobic culture yielded a streptothrix species.

The second case (Chesneau, 10) is that of a swelling 7 by 4 mm. in the lower lid touching the upper lid and being ulcerated there. Edges of the ulcer were sharp and of vivid red, its floor granulating and of dirty yellow color. After slitting of the canaliculus into the ulcer, a cavity showed containing an atheromatous mass amidst bloody pus. The walls of the emptied cavity appeared irregularly swollen and bleeding easily. There was prompt healing. Examination of the atheromatous material showed actinomyces hyphae. Cultures unfortunately miscarried.

Whilst in the former case a streptothrix proved less harmless than the whole group has heretofore been looked upon—the actinomyces in the second case (even supposing, without a culture, it to be actinomyces hominis s. bovis), as certainly proved not nearly so destructive as in other localities.

In this connection we must mention that it has been claimed in supposed cases of actinomycosis bovis that the reason the growth does not penetrate the wall of the canaliculus is that it lies within an epithelial canal and is surrounded by tear fluid, the latter being of low nutritive value. It has also been stated by Robert (11) that actinomycosis may take a mild course in other parts, more especially the tongue, nose and pharynx. Furthermore, there is a history in Italian literature by Majocchi (12) of a concretion in the duct of Wharton which resembled our concretion. The surrounding tissues had not been invaded. Unfortunately, Majocchi's argumentation for acti-

nomycosis in his case is not very convincing.

Clinically, from the differential diagnostic standpoint, it is to be noted that only very exceptionally other simulating foreign bodies are found in the canaliculi. Mitvalsky (5) had in one case a copious framework of wheat starch granules. This, then, was a case of pure foreign body inflammation. In another case of the same author's, there was found fatty detritus only. Mitvalsky does consider it not impossible, however, that here molds had been present formerly, and had perished. Axenfeld has seen syphilis of the canaliculus show the same appearance as fungus concretion.

As already alluded to, the concretion becomes darker and brown in course of time, and such ones are harder and less easily removed. In some cases calcification occurs. The mass of mold seems finally to die, when we have a calcareous body surrounded by debris. The microscopic examination by Capellini (13) of these later stages is of special interest. It is summarized by Axenfeld as follows: "The concretions contained calcium monophosphat and carbonat. In the sections a dendritic net-like structure was very evidently produced by radially arranged needle shaped crystals. The most peripheral layers of the individual crystalline masses were stained dark brown. The streptothrix elements were no longer visible; still the concretion had probably developed on such an organic basis."

It seems to be a safe conclusion to assume the dacryoliths of former times were nothing but fungus concretions of the various stages.

Whether there is a spontaneous cure we do not know, since all cases reported have been operated on by slitting of the canaliculus. Eversbusch (14) succeeded in preserving the canaliculus in the following way: Gradual dilatation of the lower canaliculus with differently sized probes was followed by syringing of the upper canaliculus with sublimat 1:10,000 aq. dest. et glycerin. aa, with gradually increasing pressure of piston. The fluid

leaving by the lower punctum helped to loosen the concretion which was located near the exit into the sac. By pressing upon the tear-sac and adjacent parts of the lower canaliculus from without thru the skin and from within from the conjunctiva with two Daviel's spoons, the whole contents were squeezed out by way of the lower punctum. After a further syringing Eversbusch carefully cauterized the depth of the cavity with silver nitrat fused to the point of the conical probe.

The greatest interest attaches to the classification of the mold. This will be realized at once from the statement that in one case at least, the fairly conclusive bacteriologic proof has been given, that in a case clinically not differing in the least from the customary picture, *actinomyces bovis* really seems to have been the pathogenic organism. On the strength of that result, the problem immediately faces us,—why should true actinomycosis in this locality prove so perfectly harmless an occurrence, as against its destructiveness in general surgery? The mere fact of its being in an epithelial canal would hardly seem to offer a sufficient explanation. The fact, then, of a highly pathogenic organism eventually forming *intra vitam*, a macroscopically sharply defined body, that thruout its existence remains detached from its host, offers, without a doubt, a wonderfully fascinating biologic problem.

It will be possible to take up but briefly the histologic and bacteriologic aspects of the subject. For a classical exposé of the whole matter those interested may be referred to Axenfeld's *Bacteriology*.

After having been looked upon at first as favus by von Graefe and as leprothrix by Cohnheim, Leber and Waldeyer, and also Graefe later on, Cohn's designation as streptothrix Foersteri (in honor of the late Breslau ophthalmologist) had become the name most used in statistics up to 1894. In that year von Schroeder (15) published his findings as actinomycosis, primarily on account of the ray formation present in the typical globular refractile bodies met with in his two

cases. It must be conceded that the diagnosis of actinomycosis was made here with as much justification as is the case with the general surgeon to whom the microscopic picture is likewise all sufficient, without having recourse to the difficult culture.

Schroeder's communication attracted general attention and a number of cases were thereafter likewise reported as actinomycosis. There has long been a general agreement that *actinomyces hominis s. bovis* belongs to the streptothrices, all of which are characterized by their polymorphism. Ray formation may be met with in any of them, but their pathogenicity is very much at variance. If it is preferred to call all ray fungi actinomyces, *actinomyces hominis s. bovis* then is one species, and streptothrix another, or rather likely several others, and we may in that sense call the affection actinomycosis.

It would appear more practical, however, to adhere for the present to the term streptothricosis, since Silber-schmidt (16) in 1900, first succeeded

by exact culture and experimental work in establishing streptothrices as the cause of the concretions in his cases. The same organism was found conclusively by Axenfeld and Cohn (17). As against these Auerbach (18) in 1902 had positive results in animal experimentation as regards "typical actinomycotic growths." Even in the face of these findings, however, the problem still remains unsolved as to why the clinical picture in this case entirely failed to offer any similarity to true actinomycosis.

In conclusion, let me say that cultures are very difficult to grow. One reason is the great number of other organisms generally present; whilst at the same time streptothrices grow very slowly, as an analogue to the closely related *mycobacterium tuberculosis*. Axenfeld recommends, therefore, to resort to anaerobic cultivation whereby one frequently would succeed in killing off the accidental organisms. He also recommends acid media. Finally, the age of the concretion tends to militate against success.

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CARCINOMA OF ORBIT PROBABLY ORIGINATING IN THE LACRIMAL GLAND.

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The case here reported recurred after excision of the tumor. But there had been no second recurrence more than four years after evisceration of the orbit. A brief account of the literature of such tumors is given. Read before the Indiana Academy of Ophthalmology and Oto-Laryngology, May, 1919.

I append to this report a bibliography of over forty articles written in our own and other languages covering most of the recent literature on the subject of tumors of the lacrimal gland. It must be freely confessed that I have, for the most part, read them simply by title. But I trust they will enable someone to discover additional facts, for which he may be in search along these lines.

The gist of the matter is that tumor of the lacrimal gland is not very common, and that carcinomata form but a small percentage of those cases that do occur. For instance, in 1868 Polailon, in his article "Pathology of the Lacrimal Gland," reviewing eighteen cases of tumor of the lacrimal gland, notes that only one was a carcinoma. Then, again, Schaeffer collected 128 cases of tumor of the lacrimal gland, going back into ancient literature for thirty of them. Of his 128 only 12 were carcinomata. Kirkpatrick reports a case of carcinoma of the lacrimal gland. He makes this direct statement: "Carcinoma of the lacrimal gland being of rare occurrence I thought it sufficiently interesting to place on record."

Elliot and Ingram report six cases of lacrimal tumor studied by them in India. They state that two of them were endothelioma; two sarcoma; one was not examined; and the last was thought by the pathologists to be a syphilitic gumma: it clinically appeared to be distinctly malignant.

CASE.

The history of the case which I wish to report is as follows: I first saw Mrs. P. M. on December 15, 1913, when she came to me to be refracted. In doing this both eyes were given the usual

general and ophthalmoscopic examination, such as I outlined in a paper I read before the State Society a few years ago. Nothing abnormal was noted except compound hyperopic astigmatism in each eye. She was also presbyopic, being fifty-nine years of age.

Vision: O.D. 20/95 with lens 20/40. O.S. 20/130 with lens 20/60.

About five months later (on May 6, 1914) patient reported again, saying that for the last two months she had noticed a growth in the left eye. This proved to be a small mass in the upper and outer angle of the orbit. As time went on this mass grew steadily larger and was painful. It restricted full movement of the eye to the left.

On July 24, 1914, I operated, aiming to remove all or as much of the tumor as possible without disturbing the eye itself, as the fundus was negative and the vision was as good as when I prescribed glasses for her in December, 1913. The mass was found to extend backward about $\frac{1}{2}$ to $\frac{2}{3}$ the depth of the ball, and to be somewhat adherent to it. It lay between the ball and the outer wall of the orbit.

I sent the specimen to Dr. W. D. Gatch, of Indianapolis, for pathologic report and received the following reply from him: "A microscopic section of the tissue which you sent us July 24th, shows that the tumor consists of cells which have nuclei of various shapes, some oblong, some spherical and some irregular. The nuclei also vary in their staining properties. Some take the hematoxylin lightly, some are pyknotic. The interstitial substance consists, for the most part, of a myxomatous material which stains a light blue and takes the eosin poorly. In other places the stroma is fibrous. The

term fibro-myxo-sarcoma, I believe describes the growth. From the history of the case, and the microscopic picture, I regard the tumor as malignant.

"We prepared sections of all the little pieces sent us and some of the smaller show a well defined connective tissue capsule which merges into a myxomatous tissue and this ends abruptly in the cellular tissue which I have described above. I would not be willing to hazard an opinion as to the degree of malignancy. The myxomatous changes would point to a low grade. But on the other hand the tumor is so cellular, and the nuclei vary so much in their staining properties, that if one regarded this part of the section alone he would think the tumor very malignant."

The pain was relieved by the operation, and the necessary canthotomy wound healed nicely. The patient was now given X-ray treatment over the area from which the mass had been removed.

On November 12, 1914, there was noticed a slight return of the growth in the same region. This was about four months after operation. By the early part of December the growth was increasing rapidly. Vision in this affected left eye remained at 20/130 but could not now be improved by a lens as heretofore, altho I could discern no fundus changes.

In view of the microscopic findings in the specimen already removed, and the rapid growth of the returning tumor, it seemed best to do a radical exenteration of the orbit. This I did under date of December 15, 1914. The malignant mass was removed along with the eye ball and the other orbital contents. Care was taken not to cut into the tumor itself. It was, however, adherent to the periosteum of the outer orbital wall. The outer 2/5th of each lid was sacrificed. Practically a new lid was made for this portion by sliding

forward the temporal flap—a plastic scheme suggested by Dr. Bulson who had seen the patient with me sometime previously.

After exenteration I cauterized the entire orbit with the actual cautery. In closing the wound, the region of the outer canthus was not only cauterized but some of the flesh down to the periosteum of the temple in this region was clipped off. The tumor measured roughly about 20 mm. vertically and 13 mm. anteroposteriorly.

The whole orbital mass was sent to Dr. Gatch who reported under date of December 22, 1914, as follows: "The tissue was much better fixed in this specimen than in the former one and I have compared sections from the two growths.

"The present section has all the appearance of a carcinoma. The cells are epithelioid in appearance and are in many places arranged in alveoli. The cells produce considerable mucous or myxomatous tissue. In other places the alveolar arrangement is entirely wanting and the cells look like the more cellular portions of the former growth, and a careful study of the former growth shows that the cells have probably been shaken out in places from their alveoli in the process of preparation. This probably deceived me as to the precise character of the growth. The growth is situated on the outer part of the eye and its character would suggest a carcinoma, probably originating in the lacrimal gland. A section from the opposite side of the eye shows no growth and gross examination of the orbital tissue reveals no growth. The eyeball itself is entirely uninvolved but the growth was slightly adherent to the sclera."

The operation was done four years and five months ago, that is, in December, 1914. There is no indication of a return of the growth.

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LANTERN AND APPARATUS FOR TESTING THE LIGHT SENSE AND FOR DETERMINING ACUITY AT LOW ILLUMINATIONS.

PROF. C. E. FERREE AND G. RAND, PH. D.,

BRYN MAWR, PA.

The apparatus here described, along with the method of using it, furnishes a practical test of light sense and adaptation by the use of the ordinary test cards under accurately known and graded illumination. It seems possible to use a lantern of this kind for ordinary clinical work. Read before the American Ophthalmological Society, June, 1919.

The incentive to this work was a request by the Naval authorities for an apparatus suitable for a quick and accurate test of acuity at low illuminations. Experience of the trial and error sort has shown, roughly speaking, that only 20-25 per cent of the men on the battleships have a sufficiently keen acuity of vision at low illuminations to qualify for all branches of the lookout and signal service work. This request came thru Commander G. B. Tribble of the U. S. Naval Hospital at Washington. The apparatus is now in use at the Naval Hospital.

An apparatus has been devised by means of which a wide range of illuminations (beginning at 0.07 meter-candles or lower) may be covered in just noticeably different steps; with no change in the color value of the light; and with a specification at each point of the intensity of light falling on the test object. The apparatus will be described here; and results will be given in a second paper covering the following points: (1) The range of minimum illumination required by a number of normal eyes for the discrimination of certain standard test objects. (2) Individual variations in the amount and rate of adaptation to low illumination in terms of the effect on acuity; and (3) sensitivity of the

acuity test, when applied at the minimum illumination at which the test object can just be discriminated, for the detection of small errors in refraction and in their correction.

THE APPARATUS.

Among the requirements for an apparatus for determining acuity at low illuminations, or the effect of change of illumination, the following points may be mentioned: (1) A means of changing the illumination by small amounts over a wide range, beginning at or below the threshold for the test object employed, without changing the color value of the light. If in making this change the color value of the light is altered, it is obvious that another factor affecting the results is introduced. (2) A means of keeping constant for an indefinite length of time any desired intensity of illumination and of reproducing this intensity at will; also the test object must be uniformly illuminated. (3) A means of specifying accurately, at any point in the scale, the intensity of light falling on the test object; and (4) it is desirable that the apparatus employed for controlling the illumination can be used with the test objects already accepted in clinic practice.

The most difficult problem one has

to face in constructing an apparatus for determining the minimum amount of light that permits of the discrimination of a given test object, more particularly if that object consists of a line of test letters, is to secure a uniform illumination of the line. This problem is relatively unimportant at the illuminations ordinarily used in acu-

image of this aperture on the test card. That is, an aperture was selected of such a size and shape that when magnified five-fold it gave a band of light which just blocked off one line of the test letters. It is obvious that this aperture could be made of different sizes and shapes depending upon what is wanted in the projected image. For

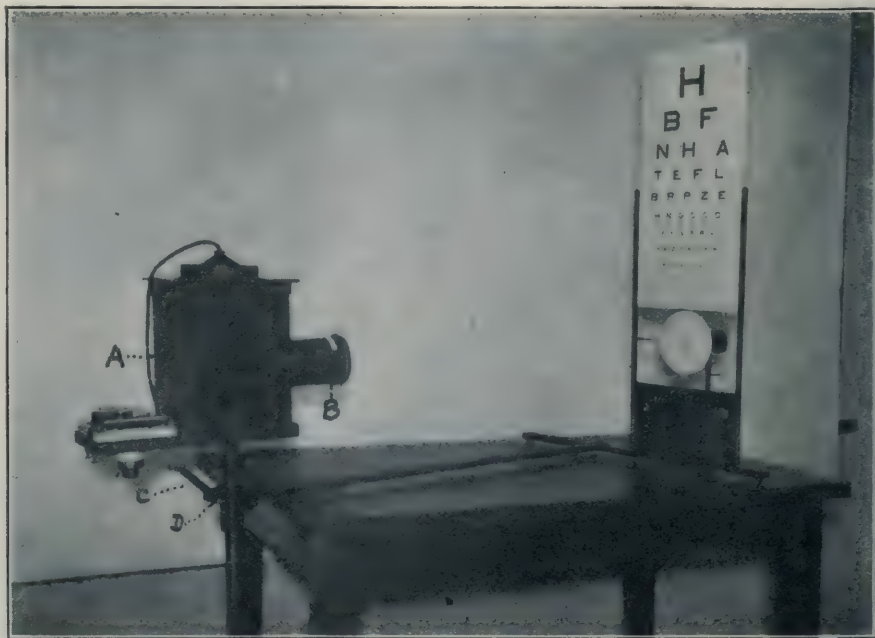


Fig. 1.—Acuity lantern and apparatus for testing the light sense and for determining acuity at low illuminations.

ity testing because at these illuminations acuity changes so slowly with change of intensity of light that the differences which may occur thruout the line of test letters do not ordinarily produce a detectable effect on the results of the test. But if no more care is exercised at the threshold to secure uniformity of illumination than is ordinarily used at the higher illuminations, no single intensity at the source will serve for the discrimination of all the letters of the line.

We were able satisfactorily to meet this difficulty in only one way, namely, by selecting an aperture sufficiently small to permit of its uniform illumination, and of projecting the magnified

example, two or three lines of test letters could be blocked off if desired, the whole card or any part of it could be illuminated, etc. There is no reason, moreover, why the aperture could not be made adjustable in size to suit the needs and preference of the individual operator.

The changes in intensity of light were produced by means of an iris diaphragm. When such a diaphragm is placed either at the front or back surface of the focussing lens, changes in the flux of light can be produced without any alteration in the size or shape of the image produced by the lens, just as happens, for example, in the action of the iris of the eye.

A photograph of the apparatus is shown in Fig. 1. At A is represented the lantern or lamp house which is of course the important feature of the apparatus. It contains the source of light, the aperture, the diffusing surfaces, the focussing lens, and the iris diaphragm. The source of light is a well seasoned type C Mazda lamp, of the round bulb stereopticon type of 100, 250, or 500 watts, depending on the range of illumination that is desired. This lamp is installed vertically in the roof of the lamp house at such a height that its filament is well above the aperture which is to be illuminated. In order to secure a uniform and diffuse illumination of the aperture the lamp box is lined with opal glass ground on one side.

The aperture, 6×1 cm., is cut at the center of the cap covering the inner end of the projection tube B. Further to aid in the even illumination of the aperture it is covered with a diffusing slide of ground glass. At the further end of the projection tube, 18.1 cm. from the aperture, in a brass ring and collar is mounted the focussing lens. This lens is 7.5 cm. in diameter and has a focal length of 15 cm.

It is scarcely needful to point out here that a different strength of lens could have been used and different relative distances of aperture and test card from the lens. With appropriate variations in these factors the distance of the lantern from the test card, and the amount of magnification of the projected image, may be varied. Any increase of magnification results of course in a decrease in the brightness of the image; hence an increase in the scale of brightness of image with no change in its size could have been obtained by increasing the size of the aperture and decreasing correspondingly the amount of magnification. In the construction of the present apparatus a 15 cm. focal length lens was used, because it could be obtained most readily on the market of the diameter needed.

Just back of the lens, mounted in the same ring, is the iris diaphragm. The pupillary diameter of this dia-

phragm ranges from 5 to 65 mm. At a suitable point on the circumference of the diaphragm is fastened a pointer which, as the diaphragm is opened and closed, moves over a translucent millimeter scale. This scale is mounted over a slot in the projection tube, and receives its illumination from the light inside of the tube. The inside of the tube is painted a mat black. To prevent the overheating of the lamp box, a rather elaborate ventilating system is provided, consisting of a light-tight ventilating hood at the top and a series of holes on two sides at the bottom of the box furnished with light-tight shields. On the platform supporting the lamp box are mounted a small Weston ammeter, and a small rheostat; to guard against fluctuations in the current and consequent fluctuations in light intensity.

In order that any line on the chart may be illuminated at will, the platform supporting the lamp box is mounted at the end of a rod which is raised and lowered by means of a rack and pinion. The pinion is operated by the small crank C, and the position of the box is fixed at any given height by means of the set screw D. The test card is mounted in a frame at a distance of 87.6 cm. from the focussing lens.

In order that the intensity of light used at any time may be known, a calibration chart is provided in which are given the readings on the millimeter scale and the equivalent meter-candle values at the test card. This calibration was accomplished as follows. The lamp box was removed and mounted on a photometer bar, at a distance from the photometer head equal to its original distance from the test card. The scale was then gone over point by point and the meter-candle value of the light at the photometer head was measured. The calibration chart is shown in Fig. 2b. In Fig. 2a is shown the calibration curve in which the divisions of the millimeter scale are plotted against meter-candles at the test card. These values are corrected to conform at the center of the card to the cosine law.

For our own use in the laboratory we have preferred to substitute for the Snellen chart a single test character. This can be turned in different directions, and the judgment of its direction rather than the recognition of the character, is required of the observer as a test of discrimination. Our reasons for this preference are as follows: (1) A

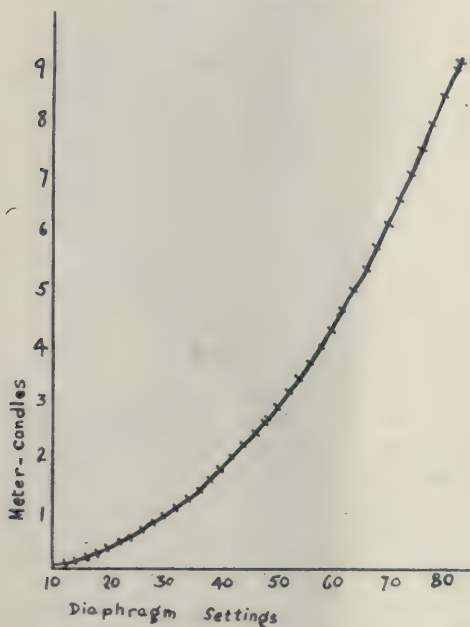


Fig. 2a—Chart showing relations of diaphragm settings (given at bottom) two meter candles of illumination secured by such settings (shown on the left).

test letter may be recognized when it is not seen at all clearly. Recognition is too dependent on extraocular functions to be used with precision as a measure of ocular capacity. (2) The different letters of the Snellen chart set an unequal task for the resolving power of the eye. (3) An objective check is had on the correctness of the judgment. This is especially helpful in case of children and the unintelligent, untrained and subjective type of adult. (4) By the use of the same test character, turned in different directions at will, all possibility of learning the test series is eliminated. Also the test object becomes much more valuable for the detection of astigmatism. (5) At low illumination the eye fatigues very rapidly. Thus if the task

is the reading of the whole line of letters, the results obtained measure not only acuity but the power to sustain acuity; which may or may not be compatible with the purpose of the test.

The apparatus was designed to meet a specific testing need of the Navy. However it has, we believe, the following uses in clinic work: (1) When used with a higher watt lamp it provides an acuity test apparatus or lantern with which the test card can be illuminated by a constant and known intensity of light, abundantly high in the scale to meet the Snellen standard of acuity. (2) When used with the 100-watt lamp it serves for those cases in which there is need for testing scotopic or twilight vision, and the amount and rate of scotopic adaptation. It thus affords a very feasible and precise means of testing the light sense in so far as it affects the power to see clearly, the effect with which we are the most concerned for the greater part of our working lives. Also the 100-watt lamp is sufficient for the testing of photopic acuity in the case of the greater number of eyes which would ordinarily be graded as normal. (3) If the image of the aperture is projected on a blank white surface of good reflecting power, more particularly if its size and shape are changed to that of a square or circle, of dimensions favorable for making a sensitive judgment, the apparatus can be used with an equal degree of precision and convenience for testing the light sense directly, in terms of the amount of light required to arouse just noticeable sensation. That is, the threshold of sensation can be determined in terms of meter-candles of light falling on the test surface. (4) By making it possible to determine with great exactness the minimum of illumination at which the test object can just be discriminated, the apparatus provides a very sensitive means for detecting small errors in refraction and in their correction, as will be demonstrated later in the paper.

Sensitivity for detecting small errors in refraction and their correction could also be added to the acuity test, by using test objects of slightly vari-

able size. However, no means has as yet been provided for making small changes in the size of any acuity object, sufficiently complicated in form to test simultaneously the resolving power of the eye in any great number of meridians which is, we believe, a very important feature in determining the exact location of an astigmatism, or the exact amount and placement of its correction.

We consider this an important feature in testing for astigmatism because of our belief that the astigmatic eye in the attempt to compensate for its defect has in many cases at least acquired unusual powers and habits of accommodation. Our belief in this is based on three sets of observations: (1) In the use of the astigmatic chart without a cycloplegic in cases of low astigmatism, one is frequently annoyed by the astigmatic indication shifting from one meridian to another. (2) We have found observers who could voluntarily, in some cases requiring considerable practice, shift the meridian showing the astigmatic indication. (3) In our test of astigmatism based on the relative speed of discrimination in the different meridians, presented to this Society last year, the speed of discrimination for the least favorable meridian can be increased by practice almost to equal that in the most favorable meridian with an equal amount of practice.

This result is so noticeable that in order to make the test sensitive we were compelled to eliminate as much as possible the opportunity for the effect of practice. This was done in two ways. The series was always begun below rather than above the minimum time of exposure required just to detect the direction in which the test object was turned; and meridians were inserted in the series clearly outside of the region of maximum astigmatic effect in order to break up any progressive tendency to accommodate, especially for the meridian showing the poorer resolving power.

The fact that the eye can with long exposures discriminate a fineness of detail in its unfavorable meridian

which it is utterly unable to master with short exposures, and that this excess lag can be overcome in a considerable measure by practice, seems to indicate that it has the power thru its active accommodation to overcome in part the effect of meridional inequalities in resolving power; at least when a test object taxing the resolving power in only one meridian is turned successively into different meridians. In any event it seems the part of sound procedure to guard against the possibility of selective meridional accommodation, by the use of a test object which taxes the resolving power of the eye in as many meridians as possible.

But even if a test object, complicated in form and minutely adjustable in size, were available; a device for determining the minimum illumination at which a test object subtending the standard visual angle can be just discriminated, would afford a still more sensitive means for the detection of low astigmatisms and small errors in the amount and placement of their correction. This follows rather obviously from the fact that for all but very low intensities acuity changes slowly with change of illumination. That is, for all but very low intensities, small differences in acuity correspond, comparatively speaking, to large changes in illumination.

Used as we have recommended, the illumination scale thus becomes in effect an amplified indicating scale; by means of which the relatively slight differences in acuity, represented by the proper correction of an error in refraction and small deviations therefrom, may be detected with comparative ease and certainty. It is not infrequent perhaps to find that in cases of low astigmatism, with the full illumination of a test object presenting no smaller gradations in visual angle than are found in the Snellen chart, the observer is able to detect no difference in the ease or clearness of discrimination of the test character thru a range of 20 to 40 degrees in the placement of the correction.

This difficulty is especially annoying in the case of children and in the un-

intelligent, untrained and subjective type of adult. In such cases the apparatus shown here is especially helpful. With it a minimum is left to the comparative and observational powers of the subject. All that he is required to do is to indicate the direction in which the test object points, the most favorable amount and placement of the correction being determined by the minimum amount of illumination at which he is able correctly to give this indication. The apparatus possesses ample sensitivity, as our results will show, for the detection of an error of 5 degrees in the placement of the correction of a low astigmatism or of 0.12 diopter in the amount of the correction.

It will be noted, for example, in the tables given in our second paper, that an error of 5 degrees in the placement of the correction of an astigmatism, produced by 0.25 diopter cylinder, required as an average for five eyes 66.5 per cent more light for the discrimination of the test object, than did the correct placement. In case of an astigmatism produced by a 0.75 diopter cylinder, it required 107.5 per cent more light than the correct placement. The large number of scale divisions between the correct and the incorrect placements of the cylinder will be noted also in these results. In case of the 5 degree displacement of the correction of the 0.25 diopter astigmatism, this difference averaged 9.5 for the five

eyes. That is, since the apparatus can be readily set to half divisions, 19 settings of the light control could have been made with precision between the values needed for the true correction and the 5 degree displacement. This shows that the sensitivity of the apparatus far exceeds the present possibilities of the precise manipulation of the correcting cylinders.

In case of an error of 0.12 diopter in the amount of the correction, 54.9 per cent more light was required for the least favorable than for the most favorable meridian; and in case of an error of 0.25 diopter, 106.7 per cent.

CALIBRATION CHART.

Diaphragm Setting	Meter- Candles	Diaphragm Setting	Meter- Candles
82.5	9.19	46.0	2.46
82.0	9.04	44.0	2.23
80.0	8.54	42.0	2.02
78.0	8.06	40.0	1.81
76.0	7.58	38.0	1.61
74.0	7.12	36.0	1.43
72.0	6.67	34.0	1.27
70.0	6.23	32.0	1.12
68.0	5.81	30.0	0.97
66.0	5.43	28.0	0.82
64.0	5.06	26.0	0.69
62.0	4.71	24.0	0.58
60.0	4.36	22.0	0.48
58.0	4.02	20.0	0.38
56.0	3.72	18.0	0.28
54.0	3.45	16.0	0.21
52.0	3.18	14.0	0.16
50.0	2.93	12.0	0.11
48.0	2.69	10.0	0.07

Fig. 2b—Calibration Curve.

INJECTION OF OILY SOLUTION OF IODIN FOR GLAUCOMA.

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MONTREAL, CANADA.

Five cases are here reported in which this new procedure was used with apparently very good results. The author had previously employed it successfully in iritis.

The similarity in the acute symptoms of septic iritis and glaucoma, if one excepts the purely mechanical effects in the latter disease; and the fact that pain in iritis is so promptly relieved by iodine, have led the writer to use this drug in some recent cases of glaucoma. The results have proved most interesting, and it seems probable that further experience will demonstrate that we have in iodine a very valuable adjunct to the measures at present employed in treating this disease. In the following cases the relief from pain and abatement of symptoms were very prompt and marked.

CASE 1. A woman of forty odd years. Left eye absolute glaucoma, right seriously impaired, was trephined some years ago with good result. Three years later she came with an acute attack, complaining of pain and loss of vision. The eye was hard, showing ciliary injection and cloudy media, apparently more from round cell infiltration than edema. She was given an injection of iodine, and all signs and symptoms disappeared promptly, only to return again in two weeks in greater severity. Another injection was given and the extraction of some roots from the jaw ordered. The symptoms disappeared as before, and did not recur at the time. Two years or so later another attack came on, while the writer was absent from the city, an iridectomy was done with unfortunate result and the sight lost.

CASE 2. Woman forty years. Had subacute glaucoma for a month with the classical signs and symptoms; after some preliminary treatment, she was given iodine, and shortly afterwards consulted another oculist who denied the diagnosis. As both my confrere and myself are capable of diagnosing glaucoma with the usual signs, it is evident that the symptoms had disappeared before the consultant saw the case.

CASE 3. Woman 35 years old. Had acute glaucoma in both eyes, the symptoms were severe and the inability to use the eye distressing. Vision 6/36 to 6/24. She was given iodine once a week for a month, and was then able to use her eyes quite comfortably, vision having returned to normal. Extensive gingivitis was treated and later two alveolar abscesses were evacuated, but the acute symptoms had disappeared before the teeth had been attended to. Recent reports nearly a year later, do not indicate any recurrence.

CASE 4. Man 60 years old. Right eye had iridectomy done, a week before the writer was asked to see the case, owing to the left eye having become affected. The patient was suffering severely, and was not relieved by the morphine which had been given. He was sent to hospital, for operation next morning, and was given iodine. He passed a comfortable night and in the morning the eye was practically painless. A trephine operation was done and there was no complaint of pain afterwards and but little reaction from the operation, vision in the left eye becoming normal in a few weeks time. Eserine was prescribed by the patient's physician during the last attack, and four days after the acute symptoms had subsided the condition was as follows:

Right eye sensitive, moderate congestion to nasal side, anterior chamber very shallow, pupil half dilated, immobile; apparently displaced upward owing to retraction being greater above than below. At eight o'clock were one or two pigment spots, one of which was within the pupil. The fundus was somewhat congested, no depression of discs, no gross change in the fields, tension not raised, vision 6/6 with + 6.5. J. 1. with + 10, better with + 11.

This case would seemingly correspond to Parker's type of glaucoma in-

volving the posterior lymphatics (A. J. O. v. 2, p. 628), but the presence of recent posterior synechiae and a dilated immobile pupil suggests both glaucoma and iritis. Examination three days after iodine had been given showed disappearance of subjective symptoms and of the congestion. The pupil was still immobile, but displacement was not quite so great. Three days after the second dose there was active contraction of the lower part of the pupil on stimulation by light, the upper part being still immobile, with an angle in the margin at eleven o'clock, due to dilatation limited to this one point. A week later the pupil was nearly in normal position, somewhat oval in shape, greatest dilatation at eleven o'clock (but no angular kink as previously). From about ten to two o'clock it was still immobile. The eyeball was still soft and there were no subjective symptoms present.

Eserin causes only moderate contraction of the pupil, the paralysed section remaining inactive. But since the margin as a whole has contracted the condition is evidently not due to hidden synechiae.

This interesting symptom-complex exhibits in an unusual manner that most constant symptom of all forms of glaucoma, interference with the motor function in the eye, and was associated at its onset with an abscess inside the right cheek; there are no teeth or roots in the jaws. When seen recently, some three months after the onset of the attack, the pupil was normal in appearance and action.

CASE 5. Woman aged 60. Has had several attacks of severe pain in the right eye during the past few months; when examined nearly a year ago no pathologic condition was found, vision with plus 7 = R. 6/5 L. Amblyopic.

The writer's experience with iodine in iritis has convinced him that it is not unreasonable to attribute to the drug the unusual effects obtained in these cases, and while sweeping conclusions are not justified by such limited evidence there are one or two practical points suggested by these results which are worth considering in

connection with glaucoma.

Iodine acts by stimulating leucocytic activity to a marked degree and thus tends to disperse inflammatory foci. So powerful indeed is its action in this respect that in the presence of gross lesions, such for instance as pulmonary cavity, acute toxemia is induced, which may end fatally.

Schnabel's observation that artificially induced arterial pulsation in the eyeball is accompanied by emptying of the veins and paling of the disc, while in glaucoma pulsation coexists with venous engorgement and a congested disc, is conclusive evidence of interference with the venous outflow from the eyeball.

The many pathologic reports published, showing alteration in the veins with blocking of both veins and lymphatics by round cells and debris furnish further evidence of this interference, which, by causing hypertension in the eyeball, compresses the outlet of the veins still more, thus establishing a vicious circle.

If now, we can by stimulating leucocytosis restore the circulation and remove the causes of stasis, and this appears to have occurred in the cases reported, we shall have practical proof of the importance of the vascular factor in causing glaucoma.

It would thus seem that the chemical and physical changes upon which Fischer lays stress are secondary to, rather than a cause of circulatory disturbance. These cases indicate also that the vascular change is due to sepsis, but further work is required to establish the rôle of the infective agent both in glaucoma and iritis, more especially in chronic glaucoma in which evidence of stasis is lacking.

In practice, the relief from pain following the use of iodine in inflammatory cases and the fact that its employment in conjunction with Elliot's operation minimizes postoperative reaction, and any tendency to closing of the trephine opening by exudate, strongly favors the adoption of this simple procedure, which in no way contraindicates ordinary methods.

If we can depend upon obtaining results such as those given above, we shall, in doubtful cases, cause arrest of the disease and disappearance of the symptoms, even while we are arguing about the diagnosis. While in severe cases iodine will enhance the result of operation and afford great relief to the patient.

Ten to fifteen minims of a one in forty solution of iodine in Sesame oil, was injected once a week under the skin with a hypodermic syringe. Judging from the strength and dose of several preparations on the market, the dose used in these cases can be increased considerably without harm resulting, possibly with benefit. Massive dosage in sepsis is recommended

by the owners of our proprietary preparation. Failing Sesame oil which is at present difficult to obtain, almond or almost any bland fixed oil can be substituted.

When is glaucoma not glaucoma? The paraphrase is certainly suggested by these cases, which, altho differing in type are obviously all related. It is far more practical in a given case, to remove disease than to demonstrate that it belongs to established type, and should be labelled accordingly. The facts above recorded indicate the direction in which we may reasonably look for further progress in treating this often intractable disease, and the case of a well known statesman whose loss of sight is stated to be due to alveolar abscess adds point to this observation.

THE ORGANIZATION AND ACTIVITIES OF THE OPHTHALMIC SERVICE IN THE AMERICAN ARMY OF OCCUPATION

RALPH A. FENTON, M.D.,

PORTLAND, OREGON.

This is a supplement to the paper of Col. Greenwood published last year, A. J. O., v. 2, p. 565., Major Fenton having been ophthalmic consultant for the Army of Occupation. The two papers constitute an authoritative history of the ophthalmic service in the American Expeditionary Forces. Authority to publish granted, Board of Publication, S. G. O.

Suggestions from Colonel Black to Colonel Greenwood regarding eye service in the Army of Occupation, as published in Col. Greenwood's report (A.J.O. v. 2, p. 583), were necessarily modified by direction of the Chief Surgeon, Colonel J. W. Grissinger, M. C., to meet conditions found on arrival in Germany. The assignment of a combined ophthalmologist and otolaryngologist to each division, with use of a field hospital in each division for mild eye cases, was never done because of lack of personnel and equipment, as well as accessibility of evacuation hospitals to divisional areas. The other suggestions, of centers for eye work in Treves and Coblenz, with auxiliary optical units for supply of glasses, were fully carried out; and the Chief Surgeon was ready at all times to facilitate in every way the elaboration of clinical equipment and the provision of highly qualified personnel. Colonel

Black's valuable counsel was available from Luxemburg on into Coblenz, during December, 1918, and again for a few days at the end of January, 1919.

During the American advance from Ligny-en-Barrois, November, 1918, thru the devastated region above Verdun and across Luxemburg, there was little special work, except for occasional cases of injury to children and other civilians from abandoned German grenades or other munitions. Several cases of this type were seen in a field hospital at Longwy, and were turned over to French authorities as the troops moved forward. Other civil cases, left by the Germans practically without medical supplies, were in charge of French sisters in a convent hospital at Longuyon, the first field headquarters. Supplies were furnished them and an army hospital worked with them for a time. While headquarters were here and at Luxemburg,

until December 1, cases were evacuated to Evacuation Hospital 15 near Verdun; and to E.H. 18, which had come up to a good location at Briey. But these were long and difficult ambulance rides over ruined roads, so that most cases were held in divisional field hospitals pending arrival of the first evacuation hospital in Treves, December 2nd, by rail.

Only one track was open from Metz to Nancy, via Pont-à-Mousson, during November and December; the old main line, Paris-Strasbourg via Metz and Verdun, was destroyed by many battles; so that over that one grapevine track, hastily lain over shell holes and thru ruins, came rations and supplies and hospital trains for the American army of three hundred thousand, and for much of the huge French force beyond Metz toward the Rhine. Trains were stalled for days waiting to pass, but the hospitals came thru among the first.

German permanent barracks and public buildings were commandeered

charge of hospitalization, on a special mission in advance of the American troops, to Coblenz and across the Rhine to Ems, on December 4, 5 and 6, 1918. During this trip, numerous barracks, schools, hotels and other public buildings were inspected; and in Coblenz and at Ems, as the German forces were still present, officers of the Sanitäts-Amt Hauptquartier VIII. Armeekorps, assisted the inspection. It was noticed that all German troops in this rearguard were well equipped, altho remarkably lacking in respect for their own officers.

Base hospitals were not sent into Germany; the readily mobile evacuation hospitals, fully staffed and fresh from their achievements on various fronts, were selected and sent up to function as bases. These veteran outfits were soon to be relieved by other excellent junior organizations, for the journey home. An ophthalmologic and oto-laryngologic service was arranged for each hospital; names and locations are listed herewith:

E. H. No.	Opened	Location	Type of Buildings	Ophthalmic Cases Handled from	Replaced by E. H.
2	Dec., '18	Coblenz	Barracks	Own command (medical, venereal, infectious)	49 February, 1919
3	Dec.	Treves	Barracks	Eye Center (surgical; 89th and 90th Divisions)	Closed June
4	Dec.	Coblenz	School	Eye Center (1st, 2nd, 3rd, 4th, 32nd and 42nd Divisions)	19 February
6	Dec.	Coblenz	Military hospital	Own command (surgical, orthopedic officers)	Closed May
7	Jan.	Prüm	Courthouse	Own command (general; 89th and 90th Divisions)	22 February
8	Dec.	Mayen	Hospital and Schools	Own command (general; 3rd and 4th Divisions)	Closed May
9	Dec.	Coblenz	Barracks	Own command (medical)	27 February
12	Dec.	Treves	Barracks	Own command (medical, venereal, infectious)	Closed May
13	April	Walferdange (Luxemburg)	Chateau	Own command (general; 5th Division)	Feb. to June
14	Dec.	Coblenz	Hospital	Own command (neuropsychiatric; Eye Center, May and June)	Now Base H. for U. S. A. in Germany
26	Feb.	Neuenahr	Hotel (Apollinaris Spring)	Own command (general; 42nd and 4th Divisions)	29 February
					Closed May
					30 February
					Closed May
					.. Closed May
					.. Closed May
					16 March
					Closed June
					.. Closed May

for hospital use; and in the barracks an immediate problem was to clean up the filth of every sort left by the retreating enemy. Improvisation of proper ophthalmologic quarters was often slow and difficult.

The writer was privileged to accompany Colonel H. C. Maddux, M.C., in

Each organization, tho supposed to bring complete equipment, needed extensive provision of supplies, due to loss and depletion during active service; and in some instances organizations had never received full outfits for eye work.

The eye and ear-nose-throat center

at Treves, E.H. No. 3, was established in the Horn-Kaserne, across the Moselle from the city.

The Coblenz center, for six of the eight divisions, was E.H. No. 4, located in the Lehrerinnenseminar on the island of Oberwerth, in the Rhine about a mile south of the center of Coblenz. German civil authorities tried to have this building exempted under armistice provisions as a school, and the young

lenz clinic, and to Capt. Clifford A. Peacock and Maj. N. P. Wood for a similar task in Treves.

Two auxiliary optical units, with a considerable supply of such lenses and frames as were still available in Paris, arrived late in December and were assigned to the centers in Coblenz and Treves. Very complete equipment for all types of eye work was assembled in these centers.



Evacuation Hospital, No. 4-22, Coblenz. Eye Center, Coblenz District

women normal students and teachers, hastily assembled, were all at work when the hospital arrived late in December. But as Col. Maddux and the writer had found German military hospital beds in place on preliminary inspection December 5th, "school" was hastily dismissed, and the Herr Direktor was restricted to four rooms of his mansion, which became the nurses' quarters. The picture herewith was taken during German occupation as an auxiliary military hospital. Similar obstructive tactics were encountered in other locations, notably Mayence.

Special commendation is due Capt. H. H. Ainsworth, Maj. Clarence King, Capt. E. J. Stein, Lieut. C. C. Cowin, and Capt. N. G. Shafritz, for organizing and carrying on the immense Cob-

Orders were issued by the Commanding General directing observance by Third Army ophthalmic surgeons of circulars and reports governing the A.E.F. before the armistice. Eye cases were ordered to the nearest evacuation hospital without delay, and location of hospitals was such that most cases could be handled as out patients. The saving in expense and hospital time, as well as in time from duty, was enormous.

The educational program arranged for the army, the large amount of accumulated clerical work in organizations, and the fact that men in the combat divisions had been moving about too rapidly for many months to secure refraction or replacement of glasses, brought out a very large number of

cases for refraction as soon as the Army reached its objectives in December.

To prevent congestion, the Commanding General ordered such cases to be handled by appointment, as out patients, in groups of not more than five or six men from a given command; such men were required to report by 8 a. m. of the appointed day; examination was made under homatropin, glasses were made and supplied, and the men were returned to their commands the same day, or at any rate within 24 hours. Glasses not available in the stocks on hand were obtained from Paris, and as a Third Army mail car came thru daily, service was far better than before the armistice.

The Paris plant, almost worn out by demands from all over France, and deprived of needed replacement material long overdue from the United States, could not fill all orders. Authority was therefore obtained from the Chief Surgeon and the 4th Section of the General Staff to requisition (and later to take over by purchase) all suitable lenses, frames or cases found in optical establishments in the American occupied area; and to ascertain facilities for delivery of more lenses from other occupied areas or even from the interior of Germany.

It was found that strikes and Spartacist disturbances had closed the huge Rathenow factories near Berlin, as well as the Rodenstock establishment in Munich; the latter was deprived of raw glass because its furnaces were in French Alsace. One small grinding plant inspected in the French area near Mayence had only unfinished stock, but reported a considerable lot of old American "export" stock on hand at its wholesale warehouse in Frankfurt. American lenses being flat, 40 mm, the great stocks of German army lenses, all toric, 38.2 mm, were useless. Comparatively few plus lenses could be found, especially in needed weak cylinders and combinations; the stocks were overwhelmingly minus and spherical.

Colonel Black and Major Edmonds (chief of the Optical section, from Paris) arrived opportunely for a few

days at the end of January, and a list of six months' probable requirements of lenses for the Third Army was prepared for the Chief Surgeon, by Maj. Edmonds, as follows:

Minus and Plus Spheres..	106 doz. pairs
(0.25 to 8.00)	
Minus and Plus Cylinders	102 doz. pairs
(0.25 to 5.00)	
Compounds, Plus-plus and	
Minus-minus	528 doz. pairs
(Sph. 0.25 to 4.00, combined with cyl. 0.25 to 1.50)	

Total 736 doz. pairs

The entire available stock of American lenses in Frankfurt was secured by a flying trip over the lines ahead of Mayence, and returned consigned to an optical firm in Coblenz, from which it was immediately requisitioned. These lenses were taken to Paris by Maj. Edmonds to be cut to the standard American size. Another enterprising Coblenz optician later secured considerable supplies of lenses from Rathenow, near Berlin, in quantities based on Maj. Edmonds' estimate, and these were either requisitioned or purchased. Many officers and men, rather than wait for lenses to be made up in Paris, took their prescriptions to German shops, where Punktal and other precision lenses could be had from Zeiss, in a few days for twenty or thirty marks the pair.

Homatropin, pilocarpin, and other alkaloids, with dionin and fluorescein, were hard to get in the A. E. F. during 1918. A vast supply of drugs was captured in the pharmaceutical warehouse of the VIII. Armeekorps at Coblenz, and large bottles with many ounces of homatropin and pilocarpin—probably more than existed in all the rest of the A. E. F.—were turned over to the Coblenz eye center at E.H. No. 22.

An advance Medical Supply Depot was opened in connection with Advance G. H. Q. at Treves, making available many instruments, including electric ophthalmoscopes. Batteries for these were obtained from the Signal Corps or German sources. Material assistance was always afforded by

Colonel George M. Edwards, M.C., medical supply officer on the Chief Surgeon's staff, in obtaining necessary ophthalmologic equipment and drugs, and in facilitating the requisition of lenses and other necessary German supplies.

The total number of eye cases treated in Third Army hospitals up to May 1, 1919, was 10,746, for a little over five months. These were divided as follows:

Cases of refraction.....	5615
Prescriptions for glasses.....	4952
Pairs of glasses made and furnished	2279
Prescriptions mailed to Paris for supply	1575

Probably about one thousand more eye cases were handled during May and June, before the Army went home. The largest month was March, with 2,372 eye cases under treatment. Of these but 250 occupied hospital beds, and 449 were in hospital for other causes. The wisdom of avoiding hospitalization of such cases, retaining them on a duty status, is thus justified.

The following is the list of ophthalmologists who served with the Army of Occupation, with their commands and the months of their service:

Maj. Ralph A. Fenton, Senior Consultant, Hqrs.

Capt. H. H. Ainsworth, E. H. 14, 4†, 22†, Dec.-Apr.

Lieut. G. C. Allen, 29, 13, Mar.-May.

Maj. John W. Burke, 22†, March.

Lieut. C. C. Cowin, 16, 22, March-May.

Capt. C. E. Edison, 4, January.

Capt. E. C. Foote, 8*, Dec.-Feb.

Capt. Patrick Gordon, 22, 16, May-June.

Capt. T. C. Gittins, 12, Dec.-May.

Lieut. Jas. Gostanian, 12, Dec.-May.

Capt. E. J. Hussey, 13, Apr.-May.

Capt. E. W. Hanson, 22, April.

Capt. Henry E. Keely, 6*, 27*, Dec.-June.

Capt. Rufus Jackson, 9, March-May.

Maj. Clarence King, 4†, January.

Capt. A. R. McKinney, 30, Feb.-May.

Capt. Clifford A. Peacock, 3†, Dec.-Feb.

Capt. R. C. Person, 14*, 16*, Feb.-June.

Capt. Ernest Rau, 2, 49, Dec.-June.

Lieut. Robt. E. Reimers, 7*, Dec.-Feb.

Capt. N. G. Shafritz, 22†, 16, Feb.-June.

Capt. E. J. Stein, 9, 22, 16†, Jan.-June.

Lieut. Justus Sutherland, 19, Feb.-May.

Capt. H. M. Weed, 26, Feb.-May.

Maj. N. P. Wood, 27, 19†, Feb.-May.

Capt. J. J. Zimmerman, 13, April.

(* also doing ear-nose-throat work; † chief of clinic.)

Interference with service due to changing personnel was met by frequent visits, by arrangement of leaves to the Coblenz and Treves centers for clinical work, and by weekly gatherings at dinner in Coblenz. Too much cannot be said in praise of those who kept on with the tiresome grind of refraction, without the incentive of active operations, month after month while others were succeeding in getting ordered home; and it is proper to say that the Chief Surgeon approved a number of promotions which were held up at the last moment, "higher up."

The constant cooperation of Major John B. Rae, M. C., Senior Consultant in Oto-Laryngology, was most delightful; his long experience with Colonel McKernon as a Consultant during 1918 made him an authority on organization and personnel.

Special study of obscure eye disabilities prior to evacuation homeward was made in the eye centers. Several malingerers were caught and returned to duty, while others who had camouflaged their visual defects in order to get into the front lines or regain their commands after injury were sent to the United States. One case of true sympathetic irritation was detected in an officer who had rejoined his outfit after treatment of an eye blinded by battle injury and refusal to permit enucleation at that time. Office work with his command in the Army of Occupation brought on the sympathetic attack which yielded to prompt enucleation of the blind eye. Many cases

of severe choroiditis, and a few of macular hole, were sent back for reclassification. A few cases of trachoma were detected; this disease was made specially notifiable by Army order, and through the Army epidemiologist prompt separation of affected individuals and observation of others exposed in commands were effected.

During March and April, a number of cases of eye injury from rifle backfire came in from certain divisions; some were serious and necessitated enucleation. Defective or ill fitting ammunition, especially clips of German cartridges used by mistake, were said to be to blame. One case, in which a fragment was embedded external to the optic foramen at the base of the orbit, came from explosion of a rifle grenade at the end of the gun barrel. For all such cases elaborate magnet and localization equipment was ready. Fourteen enucleations were done; in most cases implantation of glass spheres was made with success. Two glaucoma cases required trephine operation, one in a medical officer. A few pterygia were operated, in cases where men intended remaining in the service.

The Third Army Medical Society, which held clinics twice monthly in successive Coblenz hospitals, was given a very extensive eye and ear-nose-throat program at the Coblenz center in March; medical officers came in from all over the Army for these meetings.

A detailed study of the German method of supply of glasses to troops was made from official documents and from examination of captured material; this will be reported elsewhere.

A course in facial reconstruction surgery, arranged largely by Major L. M. Francis, M. C., of Base Hosp. 115, Vichy, and Médecin-Major Fernand Lemaître, chief surgeon of the

splendid French facial hospital there, was authorized by the Chief Surgeon for several three-week courses in Paris hospitals during the spring of 1919. A number of ophthalmologists from the Army of Occupation, in order of service; were assigned to this work, which was cut short by Major Lemaître's departure for America at the end of May.

Very remarkable clinics and lectures based on French war wounded were arranged in various military and public hospitals by Professors Morax, Sébilleau and de Lapersonne, Major Lemaître, and Drs. Poulard and Magitot. The splendid photography and lectures in English by the latter three made especial appeal. It was felt that all possible effort should be made to extend the sphere of French post-graduate teaching among American specialists, of whom a number were found working in French clinics under the provisions of the A. E. F. order permitting leaves for collegiate work. A syllabus of work observed in Paris was distributed to those Third Army ophthalmologists who had applied for this course and could not be accommodated.

Departure of the 42nd, 32nd, 89th and 90th Divisions caused shrinkage of all work, and in May hospitals were rapidly closed out and sent homeward. The eye center at Coblenz was moved temporarily late in May to E. H. No. 16 annex, in Ehrenbreitstein barracks across the Rhine, and the Treves center was closed. With the release of all evacuation hospitals in June and July, the occupying force dwindled to a few thousand, all needed special equipment was transferred to augment that on hand in the fine new Garnisonslazarett, (formerly chief hospital of the German Eighth Army Corps) used until June by E. H. No. 27, and now base hospital in Coblenz for all American troops on the Rhine.

INTERRELATION BETWEEN EYE, EAR, NOSE AND THROAT WITH PRESENTATION OF CASES

JOSEPH C. BECK, M. D., AND EMIL DEUTSCH, M. D.

CHICAGO, ILLINOIS.

Borderline cases require consideration and discussion by representatives of each specialty concerned. This series was presented and discussed at the Chicago Ophthalmological Society November 17th, 1919. see p.

Two years ago, before this society, I presented a number of cases that demonstrated the practicability of a man who practices ophthalmology of having a very good knowledge of otolaryngology, and vice versa. We know that the greatest number of specialists in this country practice these four branches at the same time—at least, in the smaller cities. It is with that view in mind that I present these cases. Personally, I see eye cases, as well as ear, nose and throat cases, altho I do not pretend to be as good an ophthalmologist as any of you men here. However, I recognize the importance of pathologic changes about the nose, throat and ear being in close relation with conditions about the eye; and therefore the importance of having an ophthalmologist associated with me who is able to assist me in the final diagnostic points. The cases I wish to present to you this evening are the following:

NEUROPARALYTIC KERATITIS

CASE I. The first case I wish to present is that of a nurse in the Cook County Hospital who was referred to me by Dr. Hassin on account of pain that she had behind her eye, and behind her mastoid, which pain radiated down into the neck, arm and to the fingers. This is recognized as the Sluder syndrome, of sphenopalatine ganglion irritation. This patient had severe pain in the mastoid region; so severe that Dr. Chapman, the attending oto-laryngologist of the Cook County Hospital, incised the drum, thinking she had acute otitis media. She did not improve following this incision, and another incision was made with no improvement whatever.

Then Dr. Holinger, Dr. Sonnen-schein and Dr. Garraghan were called

as consultants; and these gentlemen agreed that the mastoid ought to be opened because the pains were severe. A simple mastoid operation was done, without any distinct evidence of mastoiditis being present; and the patient improved for three or four weeks, but never was entirely well. The pains returned with greater severity, so that it was necessary to resort to opiates; and being at the nurses home for some time she was treated by the attending man as well as Dr. Hassin, who received the case at this point on account of the neuralgic pain. She gave a history of having had a sinus operation; and during the epidemic of influenza she was on day and night duty, and had to continue her work with a great deal of pain.

When she presented herself to me she had aphonia, and on examination I found the larynx injected, but no paralysis. It was the kind of aphonia which we characterize as hysteric aphonia. She had previously had a middle turbinectomy, but no evidences of pus. Proper treatment, following the method of Sluder for the diagnosis of sphenopalatine ganglion irritation was carried out, by the application of a concentrated solution of cocain to the sphenopalatine ganglion region without any benefit.

The injection of one per cent. carbolic acid in alcohol into the sphenopalatine ganglion was attempted, but failed. There was such hard bone in that region the needle would not penetrate and so a cutting operation was done. This was performed three days later by the aid of a bur until the sphenomaxillary fossa was opened. The sphenopalatine ganglion was injected and a characteristic reaction followed. The patient was not relieved.

A second injection was made a few weeks later, with no relief.

The patient complained of severe pain in the region of the spheno-palatine ganglion, but in addition a continuous pain along the branches of the fifth nerve, a deeper pain, which is recognized by neurologists as a Gasserian ganglion pain. These were not real recurrent attacks of Gasserian ganglion irritation, but a deep pain radiating all over the face and side of the head. These pains were severe, so that the

was a relief from pain but of short duration. After a few days the patient complained as much as ever, and I concluded perhaps I had not gotten properly into the Gasserian ganglion and decided to repeat this procedure.

The patient was reluctant to have this done unless it could be accomplished under anesthesia. I put her under a general anesthetic and took her to the X-ray room, where I performed the injection. To be certain that I was in the ganglion, I had a stereoscopic



Fig. 1. Case I. Neuroparalytic keratitis of right eye after injection of the Gasserian ganglion

patient required large doses of opiates continuously.

I was forced at this point to do something more radical, and decided to inject the Gasserian ganglion, a procedure which I have carried out a number of times without any untoward effects. It is well known that following removal, as well as the injection of the Gasserian ganglion, a neuroparalytic keratitis results. I attempted the injection in the usual manner of inserting the needle in the region of the cheek, externally and just below the malar bone, and passing to the base of the skull. Finding the so-called plateau external to the pterygoid plate and locating the foramen ovale, the Sluder needle is passed in until it strikes the anterior surface of the petrous portion of the temporal bone, in that fossa where the Gasserian ganglion lies. I injected this ganglion with the result of a partial numbness in the side of the face. This numbness

X-ray picture taken while the needle was in position. As a result of this injection she seemed to get relief. She came out of the anesthetic, with numbness of one-half the side of the face, which is absolutely characteristic of the distribution of the fifth nerve. She was relieved of the pain.

Within a few days she began to show evidences of redness in the eye. The cornea was anesthetic, as it should be after such an injection, and there was noticed a condition about the eye which I will have Dr. Deutsch, who observed the eye after that, describe. The most important fact is to protect the eye against exposure.

Following the injection of the spheno-palatine ganglion she had diplopia, with paralysis of the abducens, a condition that Dr. Sluder reports in one case. The late Dr. Holmes, of Boston, has also had this condition occur.

NASO-ORBITAL MELANOSARCOMA

CASE II. I wish to show an unmarried woman, 52 years of age, who was referred to me with a tumor in the region of the eye, the lower lid, and at the junction of the nose at the internal canthus, about the size of a walnut. (Fig. 2). The growth has been rapidly developing and at the same time ob-

nasal condition was also attacked by radium, placing 25 milligrams by means of a needle into the mass that was blocking the nose. All the above treatment was done two months ago. She returned today for further observation and treatment. I find she can breathe thru that side of the nose fairly well, whereas formerly it was en-



Fig. 2. Case II. Melanosarcoma of left orbital region



Fig. 3. Case II. Appearance after removal of tumor

structing the nose. It was firmly attached to the orbit, and the question of diagnosis and its probable malignancy came up. The eye itself showed no marked evidences of disease. Further detail will be described by Dr. Deutsch. The nose showed complete blocking, and to make the diagnosis I decided to remove the growth and make a microscopic examination. The microscopic section shows it to be a melanosarcoma. (Figs. 4 and 5). Figure 3 shows the patient immediately after the operation.

We placed in the cavity created by the excision of the tumor, 75 milligrams of pure radium, and left it in for eight hours. As a result of this treatment the cavity was entirely healed, with a whitish membrane that usually results from the use of radium. The

tirely blocked. Inspection shows there is a shrinkage of the growth within the nose, and an ectropion developed at the site of excised growth. I placed 25 milligrams of radium (pure) into the mass within the nose for 6 hours.

All authors agree that melanosarcoma is one of the most malignant types of neoplasms, very rapidly disseminating and metastasizing, especially in the liver; and according to Crile's latest statement, it is always fatal, irrespective of treatment. It will be interesting to note the result in this case, and I hope I may be able to report a successful outcome.

RETROBULBAR NEURITIS

CASE III. The early history of this young man is that in a football game he had his nose smashed, with a hema-

toma of the septum that became infected, and he had a collapse of his nose as a consequence. This was ten years ago. I corrected the collapse of the nose by the injection of paraffin. Paraffin is not used any more for this purpose. It was cold paraffin I used in this case. Recently on his return from Army service in France, he noted the loss of vision in one eye. The diagnosis was made of retrobulbar neuritis due to nonsuppurative sinus

tions, however in her case without any benefit. After several months of this treatment the patient developed a typical case of interstitial keratitis. A spinal puncture was made and a four plus Wasserman found. This case shows that an ocular condition can clear up the diagnosis of an ear condition. The patient was put on anti-syphilitic treatment, and the trouble cleared up both in the eyes as well as the ear. She has normal hearing now.

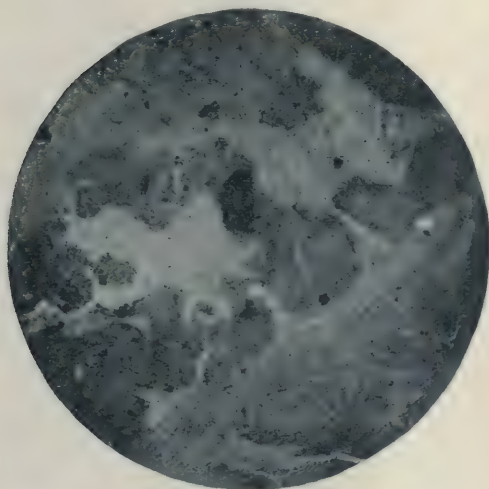


Fig. 4. Section of melanosarcomatous growth Case II, under low power

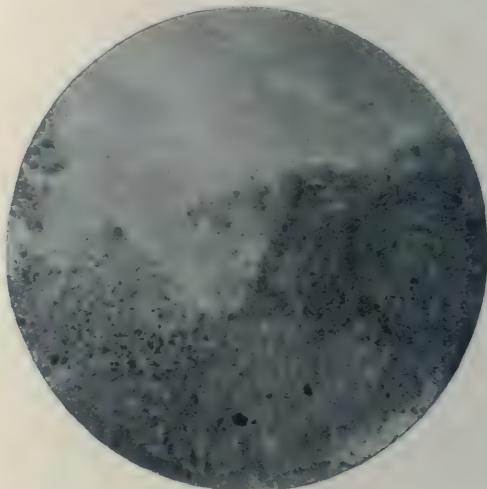


Fig. 5. Section of melanosarcomatous growth Case II high power.

disease, or hyperlastic sinusitis. An operation was performed (middle turbinectomy and ethmoid exenteration with exploration of the antrum, frontal and sphenoidal sinus) with excellent results. Dr. Deutsch will go more into detail in this case.

BLUNDER IN DIAGNOSIS OF SYPHILIS

CASE IV. This little girl, aged 14, came into our service while I was away, and a diagnosis was made by Dr. Pollock of an otitis media catarrhalis, which was markedly progressive and she was getting quite deaf. There was not anything the matter with the nose or throat, but simply deafness. This changed the diagnosis to a possible otosclerosis. The patient was treated along the line we usually treat otosclerotic cases, using adrenalin injec-

Dr. Deutsch will speak more at length about her ocular condition.

TUMOR OF THE CEREBELLO-PONTINE ANGLE

CASE V. The last case I wish to report is that of a woman, about 32 years of age, who was referred to me by Dr. Gradle with a diagnosis of probable nonsuppurative or hyperplastic sinusitis. The patient had marked reduction of vision and a large blind spot. I examined her nose and found nothing indicative of any active sinus disease, but she had nasal obstruction in the upper straits of the nose. I performed an operation on this patient, cleaning out the ethmoid cells and opening the sinuses. The vision of the patient improved for about a week or ten days. Remember that this patient had no

headache to speak of. She gave no symptoms of any kind except that she did not hear well in one ear: I did not examine carefully the ear she complained of. I was intent on doing a sinus operation to clear up a possible retrobulbar neuritis.

The patient returned to Dr. Gradle after this operative treatment, but she left the city for a rest. When she returned a few weeks later Dr. Gradle

that is, turning her over on the face, she breathed better than in the first instance, so that we could go on with the operation. There was considerable difficulty in stopping the bleeding from the flap so that some time was taken up in the exposure of the cerebellar region. We did not get a chance to expose the cerebellum completely. Barely had we taken off the bony defect over the cerebellum when the pa-

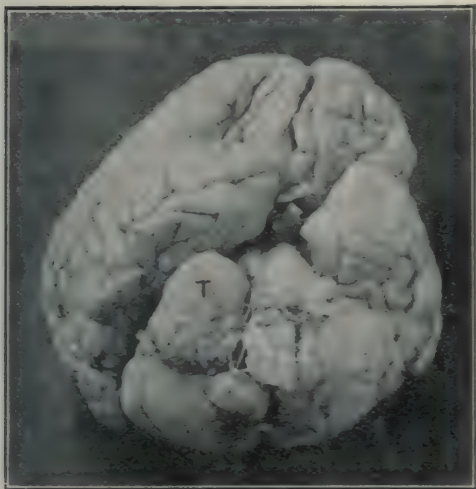


Fig. 6. Case V. Loose growth in cerebellar pontine angle. T shows the tumor in position

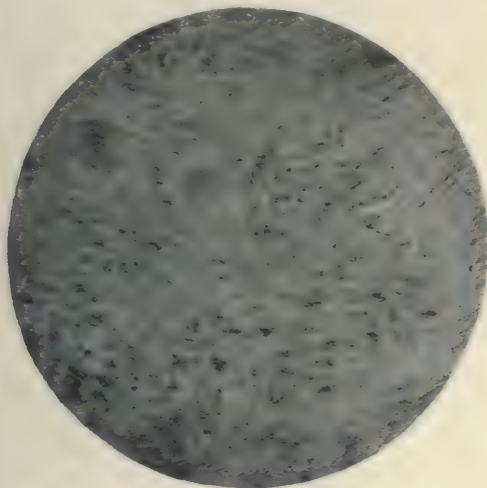


Fig. 7. Case V. Section of tumor under high power, showing structure of gliosarcoma

sent her over to me. I found, as he stated, that she had a clear case of brain tumor with a choked disk of 10 diopters. A neurologist was called in consultation. We also made careful tests in this case as far as the labyrinth was concerned, and a diagnosis was made of the cerebello-pontine tumor and an operation was advised. The patient was operated on immediately. There is one interesting point I want to mention in this case. The patient had never complained that she could not lie on her face.

OPERATION. We placed the patient with face down as we would to operate for exposing the cerebellar region. Within a few moments after anesthetizing her she began to breathe shallow. We turned her over on the back and she recovered her normal breathing. Repeating the same thing,

the patient stopped breathing. We turned her over on her back again, but all attempts at resuscitation were unsuccessful. She died on the table.

POSTMORTEM (immediately after death). On removing the brain we found in the pontine-cerebellar angle region a loose growth. The cavity that it lies in has a definite fibrous capsule. (Fig. 6.) Had we been successful and exposed the area as we had outlined it, we could have removed the growth, because on one side we would have opened the dura, and when the growth presented it would have been removed. But we did not have a chance to do so.

CONCLUSIONS. We found a cerebello-pontine angle tumor which was very unusual, in that it was so freely movable. In reviewing the literature of the cases of Koenig and Cushing and others who have reported a number of

cases, I find that no report is made of a postmortem or operation in which there was such loose attachment of the tumor as in our case. It was located in the region of the vital centers; and no doubt, in the position we placed this patient for operation, the tumor was dislodged and pressed on the respiratory centers. This is the only explanation I am able to get from physiologists, and men who have had more experience in this line of work than myself.

Histologic examination of the tumor shows it to be a glio-sarcoma. (See Fig. 7.) I traced this growth into the internal auditory meatus, but found the bone normal. It is a tumor of the acousticus, with a most unusual condition of mobility, and in operating again on this sort of case I would inquire a little more closely into the history, or would test the patient in having him assume the position for operation while in a conscious state. I turned this case in a rotating chair in the different positions and found she had a dead labyrinth on the left side. I found in the X-ray picture that the characteristic enlargement that is seen in the internal auditory meatus was absent in this case.

Ophthalmic Aspects—Dr. Deutsch

NEUROPARALYTIC KERATITIS

There are two other forms of keratitis with which this is confused. These are keratomalacia and lagophthalmus. A grouping of these three forms of keratitis seems to be favored by the fact that all seem to present various features in common, such as dryness of the cornea with desquamation, lack of irritative symptoms present, in spite of severe findings in the cornea, and lack of photophobia, lacrimation or even pain.

In lagophthalmus there is characteristic desiccation of the epithelial layers of the cornea, which occurs in cases of paralysis of the facial nerve, because the eyelids cannot close the eye entirely. The palpebral fissure is enlarged; therefore, the cornea is exposed to air and there is desquamation of the epithelial layers, such as

usually occurs in the lower segment. During the day a patient with paralysis of the seventh nerve is able by reflex action to wink with the eye and the cornea is being moistened. During sleep the eye rolls about. The lower one-third of the cornea is involved, due to exposure to air. This is characteristic of this condition.

The next comes in comparison with keratomalacia. I want to cite a case I saw not long ago in a hospital in Chicago. An intern told me about a case they had in the ward suffering from paralysis of the facial nerve, due to some extensive operation in the mastoid region, and as a result his eye was always open and the cornea hazy. I did not hesitate, upon examination of the eye, to say that it was a case of neuroparalytic keratitis. But I now realize it was one of lagophthalmus.

A boy presented himself with a deep corneal ulcer. It was so severe that the whole cornea looked a milky mush and soft. The clinician made a diagnosis of keratomalacia. It may be true in the sense of the word that keratomalacia means a softening of the cornea. That is the case in the deep forms of ulceration. But in the literature on the subject we find keratomalacia is a different condition.

Keratomalacia occurs mostly in children that are debilitated and are suffering from a severe general condition. It is characterized first by night blindness, and occurs in younger children who are not able to walk about. So we recognize this condition by the dryness of the cornea and inflammation, and by fatlike globules which stick to the cornea. The lacrimal fluid mixed with the oily substance formed does not lubricate the cornea, and consequently dryness is the result.

The case presented here tonight is one of neuroparalytic keratitis, which is always due to a removal of the Gasserian ganglion or to paralysis of the trigeminal nerve. The point in this case was that three days after the Gasserian ganglion was injected, the woman developed some discomfort in the eye. In this condition, there were marked changes in the cornea. She

complained of discomfort, and redness in the eye. There was desquamation of the superficial layer of the epithelium, and it was in the form of fissures, shrunken. We also found five or six eyelashes in her eye, of which she was not conscious, proving that sensation to pain was not present. She had an insensitive cornea. The desquamation increased for two or three days, so that in the center of the cornea there was a depression like an ulcer. The characteristic feature is that it did not spread towards the periphery, altho the center of the cornea was deeply involved. It left the margins of the cornea ribbon-shaped, with transparency about two millimeters wide, while the rest of the cornea was deeply infiltrated. This patient was put on mild treatment of sodium chlorid, and boric acid, 1 per cent. red oxid ointment and bandage, and we had no further complications, such are often reported in these cases.

Neuroparalytic keratitis is due to trophic changes. The cornea having its nerve supply from the ciliary nerves, branches of the ophthalmic which is cut off, there is no sensation to pain. Interesting experiments on animals have been made in cases of neuroparalytic keratitis and, after removal of the Gasserian ganglion, within a short time the keratitis developed. After removal of the ganglion or branch of the fifth nerve on exposing the eye to air and preventing moistening of the cornea, a depression of the corneal epithelium is noticed. On account of the lack of nerve and blood supply diminished moistening is more

injurious to such eyes than to healthy ones.

The cornea on account of lack of resistance, is liable to degenerative changes. Fuchs compares it to a form of hemiplegia, a bed sore rapidly develops on the paralyzed side, and is absent on the other side which is exposed to the same amount of pressure.

This patient's vision in the right eye, before the injection of the Gasserian ganglion, was 20/70. It is that now, but three days after symptoms were manifested it was simply perception of fingers from a distance of four or five feet, and persisted so for three weeks. The cornea is clearing up and there is hardly any danger of perforation any more.

RETROBULBAR NEURITIS

In this young man who came to us three months ago with a complaint of having lost his vision in the right eye entirely within a few days, ophthalmoscopic examination showed a typical picture of retrobulbar neuritis. There was a pericentral constriction of the field of vision, both for form and color. The case was referred to Dr. Beck, who already described the nose operation. Within two weeks, after reaction from the nasal operation had subsided, his vision improved gradually, until at present it is 20/40 with a practically normal color field, but constriction for white.

In the patient with the melanosarcoma near the region of the eye, there were no findings of the eye itself, referable to the growth. Her vision was 20/25, without any lesion in the fundus. Movements were also normal.

NOTES, CASES AND INSTRUMENTS

SOME RECENT OBSERVATIONS IN ASTHENOPIC EYES

S. D. RISLEY, M.D.,

PHILADELPHIA, PA.

In recent years I have had the opportunity to study a form of disease in asthenopic eyes which I had not before observed, but which because of its very frequent occurrence I now believe I must have overlooked. The first example to claim my notice was a case of constant pain in the head, culminating in violent exacerbations of sick headache which drove the patient to bed. To relieve these, his physician, Dr. Carol, who referred him to me for study of the eyes, had found it necessary to administer injections of morphia.

The man, aged thirty-five, was a grocer; large, stocky, fat man, weighing approximately 190 pounds, but barring his headaches, in good health. His acuity of vision was but slightly reduced, but he had a high grade of hyperopia with low astigmatism. The ophthalmoscope revealed granular changes at the fovea, and a fluffy eye ground, all details being faintly veiled by a retino-choroidal infiltrate, but no vitreous web or opacities. The veins were large, dark and tortuous to the limit of the ophthalmoscopic field. The irides reacted promptly, the anterior ciliary vessels were dilated, the anterior chamber of normal depth. The corneas and lenses were apparently transparent to oblique illumination or by transmitted light.

A solution of sulphat of hyoscyamin was prescribed to be instilled at home three times daily, and smoked glasses to be worn for protection against the light. The following day the pain in his head disappeared and with his correcting glasses $V=6/V1$ in each eye. It is my habit as a part of the daily routine in refraction work to use the ophthalmometer as a part of the preliminary examination before the use of the cycloplegic; and after the choice of a glass by the subjective

method to make a critical study with the skiascope, using a plane mirror, with +2.00 D. behind it, at half a meter. The glasses selected by this patient had given him 6/V1 vision with each eye, and the skiascopic mirror study was in full agreement. But, I noted in the illuminated pupillary area, a dotted ring, concentric with the margin of the illuminated pupil, but separated from it, and on careful focusing the inclosed space exhibited innumerable fine dots. I had not observed this phenomenon before and sought to discover the exact location of the dots and ring; but to my surprise, could see them by oblique illumination only with the loupe.

The correcting glasses were prescribed, but because of the uveal conditions the mydriatic was continued for a week or longer. The uveal conditions improved rapidly, the retino-choroidal infiltration cleared up, the anterior ciliary vessels became normal, and the ring of dots disappeared. When present, the ring moved with the cornea in all directions and without parallax. The conclusion finally reached was that this granular ring was in the membrane of Descemet, or possibly only in its endothelium, and was an extension forward of the uveal conditions; not a deposit on the surface as seen in serous iritis, but an impairment of its nutrition in the area of the corneal pole, and that it was of possible grave significance from the point of view of the corneal nutrition.

Since this observation, I have had many opportunities to verify the conclusion then reached. Indeed, I have been surprised at the many examples which have been presented for study, especially in school children with increasing refraction. In several cases there have been not only the granular ring or cloud in the cornea, but irregular diffraction shadows and whirls of light as are often seen in cases of commencing conical cornea. I have witnessed this appearance or the corneal cloud in several cases which had been under my own care for years,

where the meridians of the cornea had obviously changed after the correcting glasses had been worn comfortably for considerable periods of time; not only the degree of the astigmatism having increased, but the axis of the correcting cylinder formerly at 60° had changed to 45° or even to 30° in one case. There was marked asthenopia, uveal disease and the corneal ring and cloud as above described. The corneal nutrition had been impaired, the cornea softened and unable to resist the normal intraocular tension.

Many examples have been found in children, as I pointed out last May in a paper on "The Genesis of the Myopic Eye," presented by request to the Ohio State Medical Society. In many of these cases of increasing refraction the distension of the globe does not occur as posterior staphylomata, but as a stretching of the anterior segment, or thinning in the anterior scleral region, and they, almost without exception present the ring and granular cloud associated with the uveal disease, which is the significant underlying factor in the syndrome of increasing refraction.

So far as I know this observation is new, and I bring it before the Section in this very incomplete statement, not wishing at this time to give a detailed study of the numerous examples from case records.

CORRECTION OF IRIDODIALYSIS BY OPERATION.*

ALBERT E. BULSON, JR., M.D.,
F. A. C. S.

FORT WAYNE, INDIANA

Few of the textbooks on ophthalmology have anything to say concerning the correction of iridodialysis by operation, and those that offer any suggestions recommend removal of the bridge of iris, thus making an iridectomy with a broad base and leaving a large coloboma. Operations for the reattachment of the torn iris, or the fix-

ing of the iris in a corneal wound at the limbus, have been condemned by numerous authors, tho I am pleased to note that Wood, in his *System of Ophthalmic Operations*, as also in the *American Encyclopedia of Ophthalmology*, admits being satisfied with the results of incarceration of the torn iris in a corneal wound.

Just why this procedure, which is known by the name of iridenkleisis, should have fallen into disrepute and be considered as a risky procedure is not quite clear, except that it is generally thought that iris entangled in a corneal wound is apt to set up irritation, glaucomatous conditions, and even purulent inflammations. In the light of our present knowledge we must assume that the inflammatory symptoms are due primarily to the entrance into the iris tissue of some infectious germ, and such a complication in a large measure has been overcome by our modern aseptic methods of handling injuries. If the wound is a solid one, and closed to outside infection, there can be little danger of inflammatory reaction, and this is evidenced by the fact that many cases of prolapse of iris following injuries or operations, with incarceration of the iris tissue in the wound, have made uneventful recoveries and remained free from irritative or inflammatory reactions for long periods of time. It would seem, therefore, that it is folly to offer any objections to the operative correction of iridodialysis by incarcerating the iris in a corneal wound, on the ground that it is not a safe procedure.

I have had occasion to operate three cases of traumatic iridodialysis to correct defects that were very annoying to the patients thru double vision, movement of the torn iris, or objection to the double pupil from a cosmetic point of view.

In the first case, operated a number of years ago, the patient had a large iridodialysis occasioned by a sharp blow upon the eye, and this was corrected by making a relatively large opening at the limbus, thru which the bridge of iris was drawn, and to

*Presented before the Chicago Ophthalmological Society, on October 13, 1919.

insure its permanent incarceration in the wound it was anchored by a stitch which also enclosed the conjunctival flap without leaving any iris exposed. In this case recovery was uneventful, and, while the pupil was drawn upward to a considerable extent, yet the result was very satisfactory to the patient as well as to me. The eye remained perfectly quiet for a period of some three or four years, after which the patient was lost to observation.

The second case was a similar one, but the iris was not anchored in the wound in connection with the conjunctival stitch and it went back into the anterior chamber, but was replaced later with satisfactory results, so far as known, tho the patient was lost sight of soon after the operation.

The third case was of more recent occurrence, and in this case, with a large iridodialysis due to trauma, an effort was made to incarcerate the iris in the smallest possible wound at the limbus that would permit the introduction of iris forceps. Liebrecht iris forceps were used, the bridge of iris was seized on its torn edge and drawn into the wound sufficiently so that there was but the slightest amount of prolapse visible. No stitch was introduced. The wound was touched with pure tincture of iodine, the eye dressed with sterile vaselin, and the result was exceedingly gratifying in that it left the pupil but slightly deformed, and corrected a condition that was very annoying to the patient,—a young lady of twenty years of age. The operation was performed on May 17, 1919, and within ten days the eyeball was entirely free from inflammation or even irritation, and it has remained so up to the present time.

To my way of thinking this operation should be more generally used for the correction of extensive traumatic iridodialysis. It is preferable to the complete removal of the bridge of iris which leaves a very large coloboma with its disfiguring effects as well as irritation thru the passage of too much light into the eye, and when performed under our present methods of surgical technic it offers little or no evidence

of being what many authors term "a risky procedure."

The point I would make is that the opening at the limbus should be on the scleral side; it should be no larger than necessary for the entrance of a closed pair of Liebrecht's iris forceps; and the bridge of iris drawn into the wound should not prolapse beyond the conjunctival flap. I am under the impression that the application of pure tincture of iodine to the wound with its incarcerated iris has a tendency to prevent irritation, while at the same time it stimulates the reparative process.

CASE OF ACUTE TENONITIS

W. GILFORD DICKINSON, M.D.,

SYRACUSE, N. Y.

G. E. W., chauffeur, aged 29.

HISTORY: While driving a motor car at a rather high rate of speed very early in the morning, patient noticed that he had difficulty in moving his eyes from side to side. A few minutes following this he felt as tho his lids were swelling, and stopped the car to have the occupants look at them. The owner verified the patient's fears, and placing him in the rear seat, himself drove to the city, where the writer saw the case within two hours after the first symptom had appeared.

EXAMINATION: Very marked chemosis of both lids of either eye, extending across the bridge of the nose, firm and hard to the touch. Patient was at this time unable to voluntarily open the palpebral fissure. Upon raising the lids, with horn retractors, the globe of each side was red, swollen so that the conjunctiva extended over, and obliterated all but 5 mm. of corneal surface, and the external ocular muscles apparently fixed, as the voluntary movement was limited to excursions of about 4 mm. in any meridian. Ophthalmoscopic search of the fundus revealed nothing abnormal. The reaction of the iris was sluggish. Monocular vision was slightly below normal, probably due to the fact that it was taken while the lids were held apart mechanically. Binocular vision was not possible due

to the marked immobility of the muscles. The patient complained of no pain, but mentioned a feeling of pressure in the eyes.

COURSE: The patient was immediately taken to a hospital, put to bed in a darkened room and the following treatment instituted. Cold compresses for half an hour at intervals of two hours. Atropin instillations every hour, solution of 1%. Calomel two grains in divided doses. Sodium salicylat, ten grains every three hours. Hot water bottles to produce diaphoresis.

At the end of twenty-four hours marked improvement had taken place. The patient could now open the lids three mm., and reported that the pressure seemed relatively less. Dionin solution 5% was now substituted for the atropin and used every three hours.

At the end of another twenty-four hours the patient was discharged from the hospital, the chemosis of the globe entirely gone and that of the lids relatively reduced. There was no diplopia, and binocular vision was normal. Monocular vision was reduced to 6/9.

The patient continued his trip, wearing protective glasses, with instructions to report in four days by letter. This he did, writing that there was no perceptible swelling of the lids, but at times he sees double.

The exigencies of this case were such as to make prolonged observation impossible, and it is reported with the full realization that its statistic value is greatly impaired thereby.

A NEW AXIS FINDER.

ALFRED COWAN, M.D.,

PHILADELPHIA.

The usual method of finding the exact axis of a cylinder (unless one possesses an expensive instrument) is by looking thru the lens, along the direction of the axis, at a line, and marking the points on the meridian thru which

it passes without a break. The lens is then placed on a protractor and the exact axis found.

Not only does this examination require several steps and time in order to procure the axis, but it has several other disadvantages. It is not always possible to mark the cylinders accurately; it is necessary to have a glass marking pencil or special ink; the protractor is usually of paper and is easily soiled. For these reasons, many ophthalmologists are not as careful in examining their lenses as they should be.

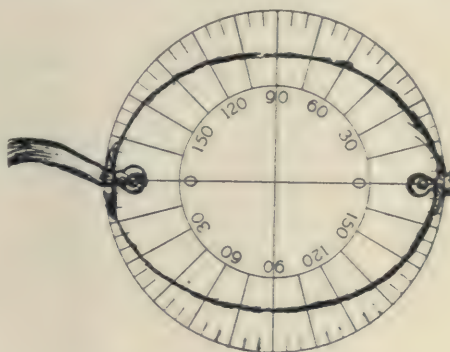


Fig. 1.—Cowan's axis finder applied to spectacle lens to determine axis.

The new axis finder is nothing more than a small round transparent protractor, small enough to be placed directly upon the mounted spectacle or eye glass lens to be tested. It may be made of glass or celluloid, either of which has its advantages and disadvantages. I have had some made of celluloid because of its cheapness and because it can be bent to conform to a toric lens. However, celluloid is less transparent than glass and scratches more easily. It can be kept in the trial case or vest pocket.

The finding of the exact axis or the center of a lens is now extremely simple, as it eliminates all but the very first step. This small device is now placed in position on the lens to be examined and by looking thru both at the same time the proper meridian noted at once.

ETHYLHYDROCUPREIN POISONING.

WILLIAM C. FINNOFF, M.D.,

DENVER, COLO.

It is a well known fact that certain individuals have an unusual idiosyncrasy for quinin, or its salts, when they are taken internally. But poisoning by the small quantity that is absorbed thru the conjunctiva in a state of acute inflammation, or from the overflow thru the tear apparatus into the nose, is exceedingly rare.

The following case occurred in a young man, aged 23 years, who had a severe bilateral conjunctivitis. Stained smears of the secretion revealed the pneumococcus. The patient was instructed to wash the eyes thoroly with boric acid solution every two hours,

and follow it with the instillation of a drop of 1% optochin (ethylhydrocuprein), into the conjunctival sac.

Thirty-six hours after the first instillation of optochin the conjunctivitis became aggravated and the lids more swollen. A fine vesicular rash which resembled an urticaria appeared on the face and neck, and on the back of the hands. The patient suffered with a severe headache and some ringing in the ears.

On questioning the patient it was learned that he was very susceptible to quinin, and had developed toxic symptoms several times after the administration of very small doses. The optochin was discontinued and a 10% solution of argyrol substituted, which was followed by rapid improvement of the conjunctivitis with a disappearance of the rash and the headache.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 East Washington Street, Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

BELGIAN OPHTHALMOLOGICAL SOCIETY.

November 30th, 1919.

Translated by Dr. M. W. Fredrick.

Wound of the Superior Rectus.

M. M. LEPLAT, Liège, showed a man who had been struck in the left eye with a knife a year previously. The blade had entered just above the outer end of the eyebrow and had penetrated into the orbit. A week after the assault the knife point bent on the flat was recovered from the wound. Leplat saw the patient a month later and found incomplete ptosis; the eye turned downwards, diplopia beyond 35°, fundus intact. As there was no improvement Leplat tried an advancement of the superior rectus in September, but was unable to carry it out, as the part of the muscle which was accessible had been changed into cicatricial tissue which was adherent to the globe.

There is more than an insufficiency of the superior rectus to be considered, as the eye is displaced downwards. The author thinks that the knife point bent on itself pushed the eye downwards with great violence, tearing the check ligaments of the superior and internal recti, thus accounting for the permanence of the ectopia of the globe. To remedy this condition the author intends to pass a double-armed thread thru the stump of the superior rectus as far back as he can, and to lead the threads along the sides of the levator muscle as far as the orbital margin, where the needles are passed thru the skin and the threads fastened to the forehead. In this way he hopes to raise the eye and to keep it in its new position by means of cicatricial bands which will form around the threads and adhere to the periosteum of the orbital margin.

A Case of Traumatic Glaucoma.

THIBERT, Liège, presented a case of traumatic glaucoma coming on two weeks after a simple contusion in the neighborhood of the upper lid. The onset seems to have been favored by unusual physical exertion with the body bent forward, the eye being predisposed to increased tension by the contusion. The increased tension was of 42 days' duration, without change in the pupil or contraction of the visual field. While in the recumbent position the tension was 12 millimeters higher than in the sitting position. This difference is explained by the greater flow of blood to the head, the eye having lost its power of vasomotor regulation. Under the same conditions normal persons show no increase of tension, so that one is forced to assume a lesion of the sympathetic ocular center of the eye. In all probability there was a tearing of the zonula of Zinn. The origin of the glaucomatous symptoms is to be sought in the vasomotor paralysis which gave rise to a repletion of the choroidal and ciliary sponge with hypersecretion of aqueous humor and obstruction of the different lymphatic vessels.

Hole in the Papilla.

VAN LINT, Brussels. A painter, thirty years old, showed an absolute central scotoma; of small size, the result of a retromacular hemorrhage. With the ophthalmoscope an atypical excavation in the temporal part of the papilla was discovered, occupying about one-sixth of the entire papillary surface. This excavation bore no relation to the macular lesion, and was probably congenital.

Varicocele of the Orbit.

VAN LINT showed patient of thirty-five with the classical symptoms of varicose dilatation of the veins of the orbit, with intermittent enophthalmus

and exophthalmus. Operation was indicated by the pains accompanying the exophthalmus. Discussing the latter case Lagrange stated that in a similar case he had opened into the orbit thru a Kroenlein boneflap and resected a large piece of the ophthalmic vein. One cannot take the whole vein out, but by removing several branches and replacing them with fibrous tissue the ebb and flow in the vein, which give rise to the intermittent exophthalmus, is brought to a standstill.

Hemiatrophy of the Face and Ocular Symptoms.

WEEKERS, Liège, reported a case of hemiatrophy of the face in which a chronic recurrent irido-cyclitis was also present. Both conditions were due to a lesion of the trigeminus. The author calls attention to the pathogenic importance of the trigeminus in certain forms of irido-cyclitis. In the case reported the pathogenesis is evident on account of the coexisting skin and bone lesions, but the relation is not always so pronounced. That this is a fact is proved by the number of cases of postgrippal neuroparalytic keratitis which occurred during the epidemic of influenza which raged after the conclusion of the war and the signing of the armistice. The corneal lesions showed wide varieties, but many of them were associated with iritis and irido-cyclitis. In some cases the corneal lesions were so slight that they were overwhelmed by the severity of the irido-cyclitis. The pathogenesis of this form of irido-cyclitis easily escaped recognition. A consideration of these facts leads to the conclusion that there exists a form of irido-cyclitis due to an alteration in the nutrition of the globe with the trigeminus as the underlying cause. It is readily understood that an infectious disease like influenza may bring on an irido-cyclitis directly thru microbic metastasis in the uvea, a lesion of the trigeminus being the precursor.

Conclusion: In the presence of these rather frequent forms of irido-cyclitis with unknown etiology one should not forget a possible lesion of the trigeminus, and to look for the

symptoms which indicate a lesion of this nerve, such as anesthesia of the cornea, of the skin of the forehead, etc.

Suture of Orbito-ocular Wounds and Deep Regional Anesthesia.

DE LAPERSONNE, Paris, advises the use of a primary suture in all orbito-ocular wounds that are quite recent. To better define the time he gives less than twenty-four hours for ocular wounds, and less than forty-eight hours for orbito-palpebral wounds. In all these cases methodic local or regional anesthesia is called for. The solution used to produce the anesthesia is an adrenalised 4% novococain solution with the following formula:

Novocain	0.08
Adrenalin 1/1,000	2 drops
Distilled water	2 cc.

Put up in sterilized ampoules.

To produce anesthesia of the globe a straight needle is inserted $3\frac{1}{2}$ centimeters beyond the inferior orbital margin, following a vertical line drawn from the external commissure. Entering at the level of the bone the needle is continued upwards and inwards, crosses the optic nerve and reaches the apex of the orbit in the neighborhood of the ciliary ganglion. The direction of the point is changed slightly and two or three cc. are injected into the cellular tissue surrounding the ganglion and the ciliary nerves. After a wait of 15 minutes the operation may proceed.

Anesthesia of the sensory nerves of the orbit is produced as follows:

1.—For the nasal a needle four and one half centimeters long is introduced just below the pulley of the superior oblique and pushed to the apex of the orbit following the superior internal angle. Two cc. of the solution are injected.

2.—For both the frontal and the lacrimal nerves one injection is enough. One should not try to reach the nerves at the apex of the orbit but at the top where they come thru the sphenoidal fissure at the external part. Closely following the external orbital margin and just below the external palpebral ligament a needle four and one half centimeters long is inserted in contact

with the bony external wall which bends backward and inwards.

3.—For the suborbital the point of entry is one and one half centimeters below the infraorbital margin, at the middle of the palpebral fissure. The needle directed upwards and inwards will strike a small depression in the bone, the foramen infraorbitale. When this is entered the patient feels a sharp pain in the teeth and the upper lip. In some cases one has to reach the superior maxillary in the orbital groove by pushing the needle along the inferior wall to the apex of the orbit.

This regional anesthesia is supplemented by lesser injections under the conjunctiva. Subcutaneous infiltration in forehead, cheek, and temporo-malar region make veritable barrages. The use of these is apparent when we consider that recurrent terminal branches of the inferior maxillary nerve are distributed to this, the skin of the last-named region.

Improvement of Our Surgical Armamentarium.

LANDOLT, Paris, has for years been busy with the improvement of our surgical armamentarium in his characteristic serious and logical way. Instead of trying to change a few instruments whose shortcomings are obvious he has gone to the root of the question by seeking what is peculiarly adapted to ocular surgery, and in what this differs from that which is useful in general surgery. To do this he has established the leading principles of ocular surgery, whence the form and the use of the instruments would follow. His basic ideas are: the organ with which we are dealing is so small, so sensitive, so mobile, and the operations practised on it so minute that our instruments as well as their manipulation require a delicacy and a precision much beyond the requirements of general surgery. Many of the instruments in general use are too heavy and too gross; the catches in certain forceps are too stiff to be operated without effort, thus defeating the delicacy demanded by the character of the operations. To obtain the precision and

sureness demanded by ocular surgery the fifth finger should rest on the orbital margin and the bulbs of the other fingers should be very near the active part of the instrument. This is not possible with the present form of most of our instruments, as the distance between the handle and the active part of the instrument is much too long. The author exhibited a number of instruments modified according to these views, and accentuated their advantages by comparing them with the improper models in general use. For instance, the handles should be of aluminum slightly adherent, clinging instead of slippery, heavy steel; they should also be rectangular instead of square. Bistouries, curettes, cystitomes, Taylor loops, etc., should all have short, flat handles, lying well in the hand; the author's lance should have a short, curved handle, with the blade shaped like the ace of spades instead of a triangle. Rather short forceps, some with teeth set obliquely, and all with very soft catches, were also shown. Special mention was made of the author's needle holder, which had no catch, but graduated pressure; his palpebral plaque which follows the outline of the globe exactly and stretches the lid equally in its entire width; his syringe for injecting into the nasal canal, short and easily handled; his needles for muscular advancement, and his double curved scissors for enucleation, which do away with the muscle hook.

The author regrets that the efforts of a single individual are insufficient to change custom and bring about the changes so desirable in our armamentarium, and invites the profession at large to associate themselves with him in suggesting and demanding rational instruments from the makers.

Decompression Operation in the Treatment of Chronic Glaucoma.

LAGRANGE, Bordeaux. The decompression operation which reduces hypertonus is the subconjunctival fistulisation of the anterior chamber. This can be achieved in various ways, and the question is as to which is the

best way. The choice is determined by the anatomy of the sclero-corneal limbus, where we find a sclero-corneal ring 1.75 mm. wide if we measure from the zone of detachable conjunctiva to the summit of the angle of infiltration. This ring should be divided into two zones, a sclero-corneal zone, and a properly so-called scleral zone. This latter has a width of one millimeter, and it is in this that the excision should be practised.

There are three reasons for restricting the scleral resections to this zone: 1. It is best to operate in the sclera only, as this tissue is fixed in its form and not disposed to proliferate. 2. It is just over the filtration zone, which is the lattice work, as it were, in the trap which covers the canal of Schlemm. 3. By keeping to this region one avoids wounding the cornea which might choke the orifice with its granulations, and one respects the ciliary body which reacts violently when irritated. There are, therefore, anatomic, physiologic and surgical reasons for selecting this place for the fistula, and a piece one millimeter in width, at the most, and two or three millimeters in length should be resected with scissors, Graefe knife, and punch; the trephine should not be used, as its action cannot be confined to the scleral band, and it is apt to slip over to the ciliary body or the cornea. The author showed in several specimens how often and how seriously these two bodies are injured by the use of the trephine.

Passing from the choice of method the question arises whether fistulisation of the anterior chamber is really accomplished, and whether a durable normalisation of the glaucomatous eye is obtained. The author is very positive on this point, and asserts that it is indeed rare that the operation of sclerecto-iridectomy, according to his method, does not give the desired normalisation; the resultant scar is sometimes flat, sometimes ampulliform. When an ampulliform scar results, and this is often the case (seven times in the last sixteen cases which the author has to add to those already published) an orifice is visible which

undoubtedly establishes communication between the anterior chamber and the subconjunctival spaces. To prove this Lagrange has twice cut into the ampoule and seen the anterior chamber empty itself in a few minutes. The author feels justified by an experience of sixteen years in asserting that decompression of the glaucomatous eye is invariably accomplished by subconjunctival sclerectomy in the limbus, and warns against the use of the trephine.

Contribution to the Trephining of Elliot.

HAMBRESIN, Brussels, has practised trephining according to Elliot forty times. He cuts a large flap thru the entire thickness of the conjunctiva, taking care not to touch the limbus, and always sews the flap. The day following the operation a strong solution of atropin is instilled. He has never had a single complication which might bring the operation into discredit. In his statistics he includes only those cases which he has been able to follow up for a year. In simple glaucoma 55% of cures resulted. In chronic inflammatory glaucoma the results were very encouraging. Six out of seven cases that were trephined were cured. He always does a total iridectomy. In acute glaucoma trephining is highly advantageous. It can be done under local anesthesia, is not dangerous, and can be carried out when the anterior chamber is absent and the pupil dilated to the maximum. There is no troublesome bleeding while doing an iridectomy, and the postoperative astigmatism is reduced to the minimum. The author has also trephined in a case of bilateral hemorrhagic glaucoma; in these cases one should touch the iris as little as possible.

DISCUSSION.—Leboucq, Gand, does not doubt that the sclerectomy of Lagrange, and the modifications of this operation introduced by Elliot and others, often produce an improvement in glaucoma, but he thinks that the principle on which it is based calls for caution. The principle is: the increase of tension is due to an obstruc-

tion to the elimination of the aqueous humor; that the obstruction is removed by an opening in the sclera thru which the aqueous may escape. Laboratory researches are not necessary to prove the inexactness of this view; by purely clinical methods one can determine: 1. In most cases of glaucoma the anterior chamber is reduced in size, in many to nothing; there is, therefore, no obstacle to the outflow of the aqueous. 2. Some eyes on which a sclerectomy has been done remain soft even after the opening has closed; others get hard again very soon after the operation before the opening has had time to close. The fistula, therefore, supposing that it did exist, which is a matter of grave doubt, seems to play a very unimportant part. In former times we used to swear by iridectomy, the operation which made Graefe famous. Statistics showed surprising results, but the *modus operandi* of this irrational operation could never be explained. Then iridectomy was decried as useless and something else invented. Today the fashion demands sclerectomy; well, let us go ahead with our sclerectomies.

Lagrange, answering the preceding gentleman: "Our colleague says the anterior chamber is often obliterated in glaucoma, and the elimination of the aqueous is very easy. He says he cannot understand why under such conditions one should make so much of the faulty excretion of the aqueous in the pathogenesis of glaucoma, and then reports cases of sclerectomy by trephining which have been so eminently satisfactory. I shall answer *seriatim* his three points, as they seem to embody all his objections.

1. The anterior chamber is suppressed in glaucoma when the aqueous has been secreted in abnormal quantities in the region of the ciliary processes; the swollen vitreous pushes the lens forward, the iris is crowded against the cornea, Fontana's space is obliterated, and to the hypersecretion of the aqueous is added a defective elimination. There is nothing there which is not perfectly clear.

2. The pathogenic theory of glau-

coma is no longer obscure; it was laid down by Donders; the glaucoma has its start in an excitation of the sympathetic vasomotor setting up a hypersecretion in the gland of the aqueous humor. Just as the cheeks flush when one has been insulted, just so the ciliary nerves of the glaucomatous subject speed up after a deep emotion or an excitement of a psychic, moral, or physiologic nature. In the beginning there is always some nervous excitement underlying every glaucoma, and all glaucomatous subjects have a neuropathic strain in them. After an eye has been the seat of several outbreaks the media are altered, and the filtration angle is clogged with waste, dross and debris of dead cells and extravasated blood cells; the drain at the angle of filtration ceases to play its part. To the hypersecretion is added hypoecretion, especially in angiosclerotics in whom the sclera is very rigid and the vessels without elasticity. Hypersecretion thru excitation of the sympathetic hypoecretion in angiosclerotic eyes, such are the features of the pathogenesis of glaucoma; and there, again, there is surely nothing obscure.

3. There is no gainsaying the fact that trephining gives results, and I take pleasure in accepting this as further proof of the value of the fistulising method. But it exposes one to accidents which I need not again enumerate, and these accidents, many in number, consisting either in infection or wounding of the ciliary body, should convince the partisans of the fistulising method that the safest method is that which uses scissors, knife, and punch to remove the piece of sclera. I prefer, naturally, my own method, but there are a number of others of merit, such as those of Holth, Jacqueau, Coppez, Ferroni, etc. Trephining is the most defective method for producing fistulisation."

Observations With Gullstrand's Lamp.

GALLEMAERTS AND KLEEFELD, Brussels, showed a series of drawings representing the normal and abnormal aspects of the anterior parts of the eye, as seen with Gullstrand's lamp.

Projection of Cinematographic Films.

H. COPPEZ, Brussels, showed:

1. A film lent by Barraquer of Barcelona, depicting Phacoerisis, which is a new method of extracting the crystalline lens with the aid of a suction cup which engages the anterior capsule of the lens.

2. Coppez then showed a film demonstrating the way in which ocular accidents occur in the porphyry quarries. The different categories of quarrymen are shown, and the visual requirements for each category are given. He lays special stress on the careless manner in which these workmen protect their eyes, with poorly fitting glasses and lenses which have become half opaque by numerous scratches. Besides, some of the quarrymen, such as hewers and rippers, are required to make such violent body movements that the wearing of protecting glasses is out of the question. A detailed paper will be written later on this very interesting subject.

3. Coppez presented four miners with generalised nystagmic neurosis; the particulars in these cases were furnished by Dr. Rutten who had these men under observation.

Wound of the Cornea by a Chestnut Burr.

LEPLAT, Liège, reported a case which is rather rare in this country, that of a wound of the cornea due to a chestnut burr which had fallen off the tree. Eight spines had penetrated into the cornea, two passing entirely thru that body. The extraction was easily accomplished with the aid of a cataract knife, and the eye healed rapidly without complication.

Genesis of the Atypical Central and Paracentral Colobomata.

VAN DUYSE, Gand. The fissural origin cannot be denied since the histologic analysis showed retinal folds at the edge of these colobomata (1898). Referring to the deep atypical retro-equatorial pit found by him in the embryo of a calf in 1900, and the lesser ones found by Szily, Wolfrum, and Meissner, the author wonders whether

in a microphthalmic eye a peduncular artery (which sometimes gives off two or three branches) might not on leaving the optic groove give rise to a secondary pitting in the annular fissure at the anterior border of the retinal calyx thru a branch anastomosing with the hyaloid plexus. There are other anatomic considerations besides a fissure between the two layers of the secondary ocular vesicle which might explain the nature of some colobomatous areas: 1. Aplasia of the pigment epithelium of the choroid, as seen in a chick embryo by Seefelder; 2. A lacuna in the pigment epithelium thru which the choroidal mesoderm has proliferated and then spread out in the subretinal space (Bergmeister); 3. Localized proliferation of the glia disuniting the pigment epithelium to reach the aplasic choroid (G. M. Van Duyse), all of which give rise to colobomatous areas of atypical character in the colobomatous eyes of the microphthalmic or cyclopean kind.

Chondroepithelioma of the Lacrimal Gland (Mixed Tumor).

BRANDES, Antwerp, and VAN DUYSE, Gand. The tumor first showed itself in 1911, the first symptom being a slight adduction of the left eye with intermittent diplopia. In the neighborhood of the orbital lacrimal gland a small hard mass could be felt; this was movable, not painful to the touch, and not adherent to the skin. The history of the patient was negative, no neoplastic antecedents, no syphilis or tuberculosis.

The tumor did not show any progress until 1917, when it began to grow so rapidly that the eye was forced out of the orbit. When Brandes again saw the patient in December, 1918, the tumor had increased to the size of an orange, the eye was lying on the cheek, but no arterial pulsation could be felt in the tumor.

Brandes made a large incision thru the eyebrow, detached the orbital fascia and came upon a well encapsulated tumor, soft, and nonadherent. It was an easy matter to shell it out of the orbit, and after checking the bleeding and

sewing in layers healing took place per primam. The eye was not touched, and after replacing it in the orbit it was held in place by a pressure bandage. At the end of six weeks the functions of the eye had returned to normal. The eyebrow had grown back, and there was no trace of the surgical intervention.

Having thus removed the tumor in toto from the orbit Brandes questions whether a local recurrence might occur, or whether this tumor might give rise to metastases. Van Duyse examined the tumor and described it as a chondroepithelioma with preponderance of the epithelial elements. It is the latter component which makes one fear a recurrence.

Two Cases of Glaucoma From Homatropin.

HAMBRESIN, Brussels, reports the histories of two women of about forty-eight, with three diopters of hypermetropia, in whom acute glaucoma came on after instilling homatropin. In both cases the pupil was of average width before the homatropin was instilled, the reflexes were good, and there was no sign of hypertension. Both cases were treated with trephining according to Elliot's method, with total iridectomy, and both recovered. The predisposing causes were age and hypermetropia. A further study of the different mydriatics used to produce mydriasis for ophthalmoscopic examination (cocain, homatropin, euphthalmin), shows that they may all give rise to acute glaucoma in a predisposed subject.

DISCUSSION.—Lagrange, Bordeaux, then remarked: "I would like to say to our colleague that I consider it very exceptional that glaucoma may be caused by a mydriatic, and I base my opinion on the fact that in the clinic of Bordeaux we used homatropin even to excess in the courses on ophthalmoscopy, in spite of which I have never seen a case of glaucoma supervene. Before me Badal used atropin freely to dilate the pupil; during the twenty-seven years I was in his service not a single case of glaucoma occurred. The real reason for the out-

break of glaucoma in Hambresin's patients is neuropathy, a peculiar excitability of the sympathetic, roused into action by the excitement of an ocular examination. One remark struck me very forcibly, that he could not consider an iridectomy in these cases of acute glaucoma. To me it seems that iridectomy is always the operation indicated in acute glaucoma; this is one of the clinical standbys that we owe to von Graefe, and I think it poor judgment to make a clean sweep of the results obtained with this operation. The road of progress is hard and long enough, and we should carefully treasure what we have acquired. Acute glaucoma, iridectomy; sclerectomy should be reserved for chronic glaucoma. This is a point which I shall never tire of insisting on."

Trepanation of the Os Unguis and Placing of a Rubber Drain in Chronic Dacryocystitis.

VAN LINT, Brussels. The skin around the lacrimal sac is anesthetised by subcutaneous injection of a 1% solution of cocain. The mucosa around the middle turbinate is anesthetised with 10% cocain. A gauze pledget is packed into the middle meatus to prevent wounding of the septum by the trepan. A skin incision similar to that made for extirpation of the lacrimal sac is made, and the edges of the wound held apart with Meller or Axenfeld retractors. The lacrimal sac is incised from top to bottom towards its outer end with a bistoury, thus laying the sac wide open. The anterior and internal walls are then excised. The retractor is then removed and the trepan placed in the lower part of the cavity in such a way that the handle rests on the middle of the superior arch. In this position the os unguis is perforated with rotatory movements of the trepan. The gauze packing is then removed from the nose. The ensuing hemorrhage is stilled by passing a strip of gauze in a Pean forceps which is passed thru the opening made in the os unguis under the guidance of a pair of dissecting forceps passed from above thru the opening. When the bleeding

has been stopped a rubber drain four or five millimeters in diameter with a flaring upper end is attached to the gauze strip with a silken thread and the strip is drawn into the nose by an assistant. The drain is in place when its end is visible in the aperture. The silken thread is then cut, the gauze strip cut thru as it enters the sac, and what remains is drawn thru the nose. To prevent further hemorrhage the nose is plugged with gauze strips. The drain is shortened in the sac, the wound closed by endermic suture, and a pressure bandage applied. On the following day the bandage is renewed and the gauze removed from the nose. The patient is warned against touching the drain. After the fourth day the dressing is omitted. On the eighth day physiologic serum is injected thru the lacrimal point, and the drain is withdrawn on the tenth to fifteenth day. For several weeks the lacrimal injection should be continued every week thru the newly formed lacrimal passages.

New Observations of the Occupational Nystagmus of Miners.

RUTTEN, Liège, in explanation of the film shown by Coppez of four miners with generalised nystagmus, stated that this condition represents a disturbance of the equilibrium, and is not due to insufficient illumination nor the abnormal position of the eye during work. Nystagmus of the body may even exist without ocular nystagmus, and may be accompanied by motor troubles of the eyelids, of the muscles of the face, the neck, the trunk, the limbs, sometimes even by a hypoaesthesia of the skin and mucous membranes, hemeralopia, photophobia, amblyopia, functional depression of the other organs of sense, and, lastly, trophic disturbances.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

November 17, 1919.

Compensation for Loss of Vision.

DR. HARRY S. GRADLE, on behalf of a committee submitted a temporary scheme, as a basis of compensation for

partial or total loss of vision; which could be utilized until such time as the committee of the Ophthalmological Section of the American Medical Association made its report.

There were several fundamental things that were to be decided on as absolutely essential, before formulating a basis for compensation. First, all vision is to be measured at a distance of twenty feet, using the illiterate E chart of Snellen.

The committee was making up a series of charts recording vision of 20/20 up to 20/200. Second, at least two months shall elapse between the disappearance of the last visible trace of inflammation and the time of examination upon which the report is to be based. In other words, an injury to the eye is to have as much chance as possible to quiet down. Third, the best possible vision, with or without correcting glasses, shall be used; provided there be not a difference of more than 4 D. spherical refraction between the two eyes. If the difference is more than 4 D. spherical refraction, the best vision of the injured eye without glasses shall be the basis of compensation. Fourth, normal vision is considered as 100. Industrial blindness is 20/200 or less, and shall count as 10. Loss of an eyeball shall count as zero. In other words, the committee decided that 20/200 be the least possible vision with which the average individual can carry on his occupation; that industrial blindness does not entitle an individual to the same compensation as complete loss of an eyeball. The individual gets 10 per cent for losing an eyeball in addition to loss of industrial vision.

The vision is recorded by the Snellen test, corresponding to visual efficiency in terms of 100, and the inverse of that or the visual loss in terms of 100.

The State law fixes the amount of compensation approximately to one year's salary. If a man has been injured in one eye and his vision is 20/40 for that one eye, he has a visual efficiency of 89 and is entitled to 11 per cent compensation.

Dr. Gradle submitted the following table:

TABLE

Vision	Visual Efficiency	Visual Loss
20/20.....	100	0
20/30.....	94.5	5.5
20/40.....	89.0	11.0
20/50.....	83.5	16.5
20/60.....	78.0	22.0
20/70.....	72.5	27.5
20/80.....	67.0	33.0
20/90.....	61.5	38.5
20/100.....	56.0	44.0
20/110.....	50.0	50.0
20/120.....	41.0	59.0
20/130.....	36.5	63.5
20/140.....	32.0	68.0
20/150.....	28.5	71.5
20/160.....	23.0	77.0
20/170.....	18.5	81.5
20/180.....	14.0	86.0
20/190.....	12.0	88.0
20/200.....	10.0	90.0

He said there are many considerations apart from the vision in the injured eye; but the present state laws and the present Industrial Commissions did not see fit as yet to recognize other things, such as vision to the uninjured eye, stereoscopic vision, and so forth.

The report of the Committee of the Ophthalmological Section of the American Medical Association would take into account all factors, and he hoped this final report would be accepted by ophthalmologists thruout the state.

He submitted the present report in the hope it would be of some value in helping the members out in their industrial work.

Interrelation Between Eye, Ear, Nose and Throat Cases.

Drs. Joseph C. Beck and Emil Deutsch read a paper, published in full in this Journal, p. 349.

DISCUSSION.—Dr. Robert von der Heydt said the case of neuroparalytic keratitis following injection of the Gasserian ganglion was interesting. Cases that did not follow this operative procedure were very rare. He had one last year at the infirmary and Dr. Lane saw it with him. It was practically the only case they ever saw of neuropar-

alytic keratitis, that was not produced by operative procedure.

He asked about the vision in the other eye, of which this girl complained. She said that for a time she saw poorly in the other eye. He wanted to know the ophthalmologic diagnosis of the condition in that eye. If there was no lesion found there, this would possibly bear a little heavily toward a psychic diagnosis for the original trouble.

Dr. Emil Deutsch said there was no characteristic diagnosis of the condition of the left eye. Vision in the left eye is now 20/25 with glasses—a myopic eye. There was nothing unusual in connection with the next case. It was one of typical interstitial keratitis except that it took an ophthalmologist to diagnose the deafness. She complained three months of deafness gradually coming on. On examination Dr. Pollock found enlarged tonsils and adenoids, and as many cases of deafness had been reported as having cleared up, following the removal of enlarged tonsils and adenoids, he removed them, and found after waiting a few months her deafness persisted, and then he concluded it might be a case of otosclerosis and took an X-ray picture which, however, showed negative.

They had given fourteen or sixteen adrenalin injections, which showed occasional improvement in hearing, until she presented herself with a sore eye and complained of something in it. One of the interns diagnosed the condition as conjunctivitis and gave her argyrol to use. The patient returned within three days with hearing very bad and her eyes getting worse. He was called to see the case then and made a diagnosis of interstitial keratitis, for the reason that in the posterior surface of the cornea there was an apparent opacity; vascularization distinctly seemed to be worse than ever before.

He recalled a statement made in one of the textbooks that during the stage of interstitial keratitis the hearing, if due to lues, was always worse. So in looking over her physiognomy for characteristics of lues, the nose, fore-

head, face and teeth were all negative, and she had no symptoms which would lead one to suspect a luetic condition. Spinal puncture was made and without waiting for the result of laboratory finding they gave her small doses of neosalvarsan with the result that her hearing began to improve until today she had about six or eight injections. Her hearing was practically normal now.

As to the eye he could only say that for interstitial keratitis, treatment with neosalvarsan was not very successful. The administration of neosalvarsan in her case proved very beneficial because she could not tolerate any form of mercury or iodid of potassium. The interstitial keratitis and hearing cleared up nicely by this treatment alone. Her vision was 20/50, had gradually improved, and the central opacity in the cornea might clear up further.

Dr. Clarence Loeb in connection with the case of neuroparalytic keratitis, reported a case he saw at the Michael Reese Dispensary of a woman, 40 years of age, who presented herself with ptosis on the left side, and the only history he could obtain from her was that it followed shortly after injection in the cheek for neuralgia. It occurred to him, if this case was the result of the injection of alcohol the operator must have taken quite a roundabout way to get the third nerve, and it seemed to him it should have produced more destruction in its path than it did.

He asked some of the members to speak of the possibility of such a condition following the injection of the Gasserian ganglion.

Dr. George F. Suker, in reference to the nerve case, said that in these cases examination of the teeth usually disclosed the characteristic syphilitic markings in the six year molars—the Darier-Fournier-Hutchinson molar. This patient showed such molar markings. Perhaps the deciduous teeth showed these syphilitic markings, and if so, the permanent incisors frequently escaped the characteristic markings. The patellar reflexes in interstitial

keratitis were more or less reduced, but never entirely absent. The interesting feature in this case to his mind was the fact that this condition had cleared up under neosalvarsan treatment. He would necessarily take it to be the parenchymatous or nodular form of interstitial keratitis, and not the striated or linear type. The striated type was not affected by any form of antiluetic treatment one might institute. Scrapings of the cornea in the parenchymatous or nodular type in dark field illumination, often showed the spirochetes and in such cases anti-syphilitic treatment was of special value.

Dr. Suker said that up to the present time no trophic nerve fibers had been isolated, i. e., fibers governing nutrition pure and simple. As this was still a mooted question, neuroparalytic keratitis was somewhat of a misnomer. The fifth nerve was not necessarily the one which carried the nutritional fibers, as far as we knew. Howell, of Baltimore, was not at all sure that the fifth nerve carried so-called nutritional fibers. That it was a trophic disturbance in the true sense of the term, nutritional — yes; but that these changes were due to nutritional nerve fiber involvement—no.

He asked Dr. Beck why he did not do decompression under a local anesthetic. The result might have been somewhat different. One could do very large decompressions under apothesis, without any pain whatever. It was not unusual for patients, with face down, under a general anesthetic to have respiratory difficulties which did not necessarily obtain when the operation was done under a local anesthetic, like apothesis.

Dr. A. A. Hayden stated that in the first case of neuroparalytic keratitis Dr. Beck was particularly fortunate in having so favorable a result as he had in regard to the right eye. The speaker had had the opportunity to see at least one case of neuroparalytic keratitis, following injection of the Gasserian ganglion with alcohol, in which removal of the eye was necessary.

Dr. Beck. In regard to the case whose brain was on the table, the hearing was absolutely gone on that side. He suggested that, instead of turning tests to establish the function of the labyrinth, caloric tests be made, as they would have been much easier to make and much less distressing to the patient.

Dr. Suker spoke of using a local anesthetic. He wished he had done the operation under local anesthesia, but it was not possible to have the consent of the patient, or that of her husband to do so. As to the mobility of the tumor, he looked up the literature, and neither Sir Victor Horsley or any of his associates of England, nor Cushing of this country reported any case of such looseness of a tumor as shown in this case. He reported three or four years ago his own brother's case (Dr. Rudolph Beck); in which at the post-mortem examination, made by Dr. Herzog, the tumor dropped out of its own accord, as he (Herzog) removed the brain; but there was an attachment by the pedicle which had torn away. This tumor was loose and it could be explained how in the change of position of the patient pressure on a vital spot or center could take place and cause death. Whether it did or not, he did not know.

In reference to ulceration of the cornea following Gasserian ganglion operations or injections, he had seen two cases in which not enough care was taken in the protection of the eye, and the probabilities were there was a primary infection of the eye.

In regard to the Wassermann test, the point was well taken. For himself he had established the rule of making a routine Wassermann in all cases newly admitted, and was astonished in some cases to get a positive Wassermann and response to treatment when he least expected it.

Retinitis Proliferans.

Dr. Raymond R. Harrington (by invitation) reported this case. The patient, Peter M., aged 25 years, presented himself to the Illinois Charitable Eye and Ear Infirmary, August 1, 1919,

and was admitted to the Remmen Service. The speaker was the first one to see the patient and to examine him. About eight months ago, while over in France, he was wrestling and during the engagement he became suddenly totally blind in the left eye. He did not report the incident to the medical men in charge, for fear of not being permitted to go to the front. Several days thereafter he told a physician friend of his blindness and was advised to take K. I. Vision was totally absent for several months and he was discharged from military service by memorizing the chart.

Examination revealed R 20/15; L. 20/40; tension R 23-L. 20. Cocain, 4 per cent. was instilled into each conjunctival sac until full dilatation was present. Examination of the right fundus showed the disc very well outlined, veins and arteries clearly perceptible, white lines prominent, vessels clear and distinct, the region of the macula clear and distinct. Examination of left fundus proved more interesting. The first view obtained showed a large white crescentic line running from below the disc, across the disc, and at temporal disc outline, branching off into a Y-shaped affair. The disc itself was perfectly clear, with a +2.00 D. lens. Veins of normal proportion, arteries the same, white lines showing very clearly. The fundus was very much infiltrated with hemorrhages, but there seemed to be none in the region of the macula, which was perfectly normal.

Patient was seen once more, but failed to appear again. No diagnosis was made at this time except a tentative one of rupture of the choroid. No blood vessels appeared over this white line, but one could see them go to the border and then reappear on the other side.

On November 5, 1919, patient again came to the dispensary claiming that it appeared to him as tho a veil were thrown across the right eye. At that time vision was R 20/15; L 20/30; no pain. Blood pressure, systolic, 125; diastolic, 70; Wassermann, 100 per cent. negative. The eyes were

again dilated with cocain and homatropin. Fundus of right eye normal and same in appearance, as when the speaker saw it last August. Fundus of left eye showed hemorrhagic spots practically absent; macula clear but the white line or band still present and of same size and character. This time both band and disc were clear—but when +6.00 was used band was brought forward and was very distinct, while disc was back and hazy. Upon close examination with a +6.00 there was only one minute blood vessel crossing the band and that was close to the disc. The other vessels seemed to run under.

Under homatropin and cocain the trial case shows — R + 1.00. Sph. L — 0.25 Sph.

Patient is wearing glasses and seems perfectly comfortable. In this case the speaker was unable to elicit a retinitis (vasculitis or perivasculitis) as so many authors claimed to exist before a retinitis proliferans occurred.

Coloboma of Sclera and Hernia of Choroid.

DR. HARRINGTON. A patient, aged two months, was brought to the Infirmary by a visiting nurse. The baby was born August 1, 1919; normal delivery, after eight hours of mild labor. Ever since birth the mother had noticed a small tumor mass on the right eye, to the outside of the pupil. At times, the mass seemed larger than at other periods, more so when the baby cried.

Child was well nourished. Tension in both eyes equal and normal. Small tumor mass on right corneo-scleral margin, about 10 mm. in the horizontal direction, and about 8 mm. in the vertical. Mass was of an epithelial character, no external growth of hairs. Neoplasm was not hard nor soft; it moved in any direction, even tho it seemed to be partially attached to the cornea. Pupil responded to light; ciliary body intact. Diagnosis a dermoid tumor. Operation and removal of the tumor was advised, to which the mother readily gave her consent.

The baby was placed on the operat-

ing table and cocain 4 per cent administered. The tumor was strongly adherent to the cornea and also to the scleral conjunctiva, but a distinct attachment to the same. Dr. Lebensohn and the speaker decided to begin the operation by removing the mass from the corneal surface. Slow sharp and blunt dissection was resorted to; the hemorrhage was profuse; they dissected the tissue about 2 mm. from the corneal scleral margin, when the color underneath changed from a white glistening one to a light blue. At first, they did not know what was before them, then decided it was the choroid, and as the baby was moving around to such an extent that operation was impeded, they thought it best that a general anesthetic be given. Light ether narcosis was produced, and again the operation proceeded. The covering was slowly dissected up and now choroidal tissue was plainly seen. The remainder of the sac was easily dissected off, and now one could easily see an absence of sclera and hernia of the choroid. They could easily reduce the hernia but found the coloboma was so great the edges could not be coaptated. Too much tension was deemed out of the question as they might alter the fundus condition.

The conjunctiva on either side of the hernia was dissected back for about one-half inch and a mattress suture applied. Then the overlapping edges were brought together by interrupted sutures. Bichlorid ointment was applied and a pressure bandage. The eye remained covered until three days after the operation, when the bandage was removed, and there was no inflammatory reaction. Twelve days after the sutures were removed and to date the conjunctival flap seems to be serving the purpose. The hernia was about four millimeters in diameter.

DISCUSSION.—Dr. Michael Goldenburg said he would like to hear the members discuss what should be done for coloboma. Should an attempt be made to close it up or permit it to remain? The probabilities were that if nothing was done to close it up the opening would result in closure as the

child grew up. He suggested that the transplantation of fascia might close it up permanently, altho he had never tried it. It appeared to him as a possibility.

ALFRED N. MURRAY,
Secretary.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

January 9th, 1920.

President, DR. J. S. WHITE.

Industrial Blindness and Compensation.

DR. SAMUEL G. HIGGINS of Milwaukee, as guest of the Society, read a paper on "Industrial blindness in relation to the Workman's Compensation Act." This talk covered practically the same ground as Dr. Higgins article in the AMERICAN JOURNAL OF OPHTHALMOLOGY. (v. 2, p. 813.)

DISCUSSION.—DR. Frank Burch expressed the opinion, that the question as to whether the amount of vision left the workman after injury would permit him to continue with the work for which he had been especially trained, should be taken into consideration; as should that of diplopia and the possible subsequent exclusion of the impaired eye. He thought that special consideration should be made in those cases in which a man with one amblyopic eye sustains an injury to the "good eye," that charts should be standardized and that the question of limitation of the visual fields should be taken into consideration.

DR. J. D. Lewis brought up the question of central injuries to the cornea, leaving opacities which destroyed central vision but did not impair peripheral vision; stating that when peripheral iridectomy was performed in these cases it was followed by diplopia. He cited one case in particular in which he had advised against it.

DR. Robinson, of Duluth, called attention to the fact that the State Supreme Court had ruled that the condition of the uninjured eye had nothing to do with the case, altho this would appear to the layman to be a palpable injustice.

DR. Morton emphasized the importance of the peripheral fields of vision and urged the adopting of uniform charts with a uniform system of illumination.

DR. Boeckman expressed the opinion that the old Snellen test letters should be supplanted by the broken ring test; which, having no relation to language or literacy, could be standard the world over. It being "unlearnable" was a further advantage.

DR. Higgins in closing the discussion laid stress upon the fact that it was necessary to avoid the tendency to be "ultrascientific" in the consideration of this matter. The industrial commissions in the various states were interested in it from a practical standpoint only and looked to the ophthalmologists of the country to get together and agree upon a simple, practical plan of estimating the impairment, one that should so far as possible be entirely fair to the employer and the injured man.

It is, of course, understood that the amount of disability cannot be worked out with mathematic exactness. It is the personal opinion of the conscientious and competent doctor that is wanted by the Commission. Dr. Higgins said that the effort was being made to arouse the interest of oculists in this important matter in order to establish a working basis upon which we could all agree, and which could be accepted by the various State Commissions as representing the consensus of opinion of the profession.

ARTHUR EDWARD SMITH,
Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY.

December 20, 1919.

DR. H. M. THOMPSON presiding.
Meibomian Granuloma.

G. F. LIBBY and W. C. FINNOFF, Denver, presented a woman aged 36 years who had originally consulted Dr. Finnoff in June, 1919, because of a granulomatous swelling of the left upper lid margin. At that time the patient had been treated for several

weeks by the family physician, the treatment consisting of squeezing, and there was a little pus superficially, making the condition appeared as tho it had been a hordeolum originally. It looked a little like a granuloma. Dr. Finnoff cauterized it with the actual cautery, and it improved considerably. When examined by Dr. Libby on December 20, 1919, the center of the left upper lid margin presented a swelling the size of a small split pea, protruding about 2 mm. from the free edge of the lid, and slightly scabby. There was no discomfort, but the patient felt that the growth was unsightly. The case raised a question of differential diagnosis between granuloma, syphiloma and epithelioma.

DISCUSSION. W. H. Crisp, Denver, suggested that the condition was purely a chronic irritation secondary to chalazion, and that it would yield to radical treatment, that is to say opening up each of the swellings present, both inside the lid and at the lid margin, and thoroly cleaning out the diseased tissue.

C. E. Walker, Denver: In such cases I have been in the habit of making an intermarginal section along the edge of the lid, making a V-shaped opening, and removing the tissue entirely.

A. C. Magruder, Colorado Springs: In these indurated conditions, before resorting to any such measures as Dr. Crisp has suggested, I have used massage and heat.

H. M. Thompson, Pueblo. I have found it beneficial to express all the ducts, by squeezing the two lids together.

E. R. Neeper, Colorado Springs: With me it is a regular practice to squeeze the edges of the lids together, and I have not run across anybody else who does it. I place the right thumb above the upper lid, and the left thumb below the lower lid, and press the two inner surfaces of the lid margins together. It is surprising the amount of material one gets. By going over the lids two or three times in this way one can often restore the secretory function of the glands.

Keratoiritis of Traumatic Origin.

G. F. LIBBY, Denver, presented a man of 62 years who had had a fair-sized corneal ulcer, of apparently traumatic origin, which was healing satisfactorily. The ulcer was of eight weeks' duration, but had been under special treatment only eleven days. The vision of this eye was reduced to 5/80, altho that of the right eye was 5/7.5. Satisfactory healing of the ulcer had followed light but thoro cauterization with nitric acid at the first visit; but a week later, very severe pain developed and the pupil ceased to be widely dilated, altho there were no adhesions.

DISCUSSION. E. R. Neeper, Colorado Springs: I think the keynote of these cases is to get at the physical causal relations which will admit of the development of the condition. To size the man up by his appearance, I should think of his intestinal tract. In dealing with these ulcers, we probably always as a matter of routine examine the upper lid. Contact of the lid with the abnormal corneal tissue may start more or less roughness of the lid epithelium. As an ulcer case progresses, if the lid takes on such a boggy condition as this lid presents, I frequently wind cotton on a toothpick, and rub the roughened tissue of the lid freely.

W. H. Crisp, Denver, felt that in such sluggish cases, where there was not a so-called neuropathic etiology, a focal infection was to be looked for.

H. M. Thompson, Pueblo, suggested that the condition of the patient called for the use of eliminatives and tonics.

Removal of Lens from Injured Eye.

D. A. STRICKLER, Denver, presented a boy of 7 years who on August 7, 1918, had been injured by the explosion of a dynamite cap with which he had been playing. Both eyes were severely injured, the left so seriously that it was removed at once. The right eye had repeatedly failed to show foreign bodies by the X-ray, but a low grade inflammation had persisted for a long time. The fundus had never been seen, but there were white masses in the vitreous. Cataract had later de-

veloped. The eye was at present relatively quiet, and there was light perception with good projection thru a widely dilated and fixed pupil. The case was presented for suggestions as to the advisability of removing the lens in the present condition of the eye.

DISCUSSION. C. E. Walker, Denver. There has probably been a great deal of iridocyclitis, the color of the iris being greatly changed. As there is not too much irritation at the present time, it might be a good thing to do something with the lens. If the lens is left alone there might be a persistent iridocyclitis and destruction of the eye.

Edward Jackson, Denver: The eye is, I believe, one that fully justifies an attempt to get a clear pupil, by removal of the lens. It would be freer from risk of subsequent reaction if the condition were left for six months or a year more. There may be an opacity in the vitreous off to one side, altho the peculiar way in which the lens is broken up makes this uncertain. I recently saw a case, in a man who had been slowly developing senile cataract, in which almost within a day or two the sight of the better eye was almost completely lost. The history was such that I thought the man must have suffered an intraocular hemorrhage, but on examination no serious complication had apparently arisen. I extracted the lens, and across the middle of it was a place which looked as tho the lens had ruptured within the capsule, with a rapid increase of opacity. I believe that in Dr. Strickler's case something of this kind may have happened. The promptness of light projection makes it quite hopeful that the patient will have useful vision, but to give him the best chance I believe he should wait some months or a year.

Paralysis of Motor Oculi; Sudden Recovery.

D. A. STRICKLER, Denver, presented a man aged 31 years who between September 3 and September 14, 1919, suffered from headache of increasing severity over the left side of the head and settling over the left eye. On September 10 vomiting occurred, lasting about

thirty minutes. On the night of September 14 the left eye closed. When the patient first came for consultation on the 17th of September he was found to have complete paralysis of the left third nerve. The dilated pupil contracted slightly to light, but not to accommodation. The vision of the right eye was 20/50, corrected to 20/20, that of the left eye without correction 20/100. The fundus was negative. Wassermann test was negative, and X-ray examination was negative as to the sinuses. On October 13, the middle turbinate was removed, and the posterior ethmoid and both sphenoid sinuses opened, all of them seeming normal. There was no apparent improvement in the condition until about November 10, when the pain rather suddenly ceased and the diplopia disappeared. At the time of report the vision of either eye was normal, but there was exophoria of 14° at twenty feet and of 24° at thirteen inches, and a slight insufficiency of the left inferior oblique muscle.

DISCUSSION. Edward Jackson, Denver: We ought to mention in connection with this case a condition which has probably given rise recently to more scattered literature than any other affecting the eye, namely *lethargic encephalitis*. I think that I have seen one atypical case of this condition. The four things which are most typical of the disease are a very gradual onset, some fever, oculomotor paralysis, and the condition of lethargy. But in about twenty per cent the lethargy is absent. The ocular paralyses are irregular, sometimes come suddenly and go suddenly. In the case I saw there was a distinct history of diplopia lasting one or two weeks, then clearing up, and again coming on. The larger proportion of the cases have recovered, altho more of the fatal than of the light cases would be reported. While this is not clearly one of those cases it is not clearly in any other class of cases that cause oculomotor palsy.

More frequently decided weakness of the muscles remains for several weeks. There is a very strong tendency of these cases to get better. In

the cases that come to autopsy there is an infiltration in and around the vessel walls in the brain, and not much meningeal involvement. I think this condition has not been enough in the minds of doctors, either oculists or others. The case I saw I referred to a neurologist, who tried very earnestly to convince himself that the condition was syphilitic. She is, however, a married woman with a large family of children, in all of whom and in herself there is no clinical evidence of syphilis. Lethargic encephalitis is probably a specific disease, except that a good many cases have had a previous attack of influenza. About 1890 and 1891, in Italy and Austria particularly, occurring after that great epidemic of influenza, cases were reported, and two hundred years ago cases apparently similar were reported after attacks of influenza.

G. F. Libby, Denver, mentioned two cases of transient oculomotor paralysis which had been referred to him by Dr. M. Kleiner within a period of three days. The first was in a boy of 14 years who had been suffering from pneumococcic tonsillitis for three days, when there developed sudden dilatation ad maximum of both pupils, accompanied by ptosis of the left upper lid. Accommodation and muscle balance were unaffected. The ptosis disappeared in four days and the pupils became normal in eight days. Three weeks later the mother reported that the right pupil had dilated once only and that there was slight ptosis temporarily if the child became very tired.

The second case was in a man of 56 years. He developed ptosis of the left upper lid and paralysis of the left inferior rectus, one day after severe gastrointestinal disturbance, which had followed marked indiscretion in eating. In this case also the accommodation and the pupils were not affected. The left eye turned 2.5 mm. higher than the right, and required a 20 degree prism to overcome the resulting diplopia. Both the ptosis and the diplopia disappeared after six days, and fifteen days later they had not reappeared. In each case a diagnosis of toxemia affecting the

oculomotor nerve was made, and a correct prognosis of early recovery was given.

F. R. Spencer, Boulder. In these cases, in addition to focal infection, one has also to think of syphilis and tuberculosis, and of the gastrointestinal tract.

C. E. Walker, Denver. When I cannot find that there is a focal source of infection in the tonsil, the nasal cavity, or the digestive organs, I refer these cases to a genitourinary specialist, and have found sometimes that infections in the prostate gland were giving the same kind of trouble as we sometimes find from the tonsils or the teeth or the nose.

H. M. Thompson, Pueblo. I should hesitate to attribute a third nerve paralysis that exists for any length of time to an intestinal intoxication, and I believe it is also rare with a focal infection. I get the impression that these cases of lethargic encephalitis usually follow influenza.

Drusen of the Disc.

E. T. Boyd, Denver showed a man of 44 years, with perfectly normal vision, each of whose optic discs showed a number of glistening masses of the kind commonly known as drusen.

DISCUSSION. Edward Jackson, Denver. In nearly all the cases I have seen the drusen have been located in other parts of the fundus. The vision was also usually more or less reduced where the condition appeared on the disc, altho this was not true of the cases where it appeared to be on the choroid. As I recollect, the vision has also usually been more or less reduced where the condition appeared on the disc, altho this was not true of the cases where it appeared on the choroid. In one case in a young woman I watched the development for several years in the choroid at the macula. Finally the vision did come down to perhaps $\frac{3}{4}$ or $\frac{2}{3}$ of normal. In the case presented, it looks to me as tho the discs were distinctly congested and as tho there were some other exudate besides the drusen.

Dust-like Persistent Pupillary Membrane.

J. M. SHIELDS, Denver presented a man aged 28 years whose eyes were normal except for a deposit of brownish, dust-like particles on the anterior surface of each lens. The particles were extremely numerous, fairly evenly distributed, and much more abundant in the left than in the right eye. There was also a minute tag of brown tissue at the upper inner pupillary margin of the left eye. The personal history was negative, with the exception that the patient said that he had had very sore eyes when five or six years of age.

DISCUSSION. W. H. CRISP, Denver, suggested that the case was probably one of an unusual form of persistent pupillary membrane.

Copper Wire in Anterior Chamber.

A. C. MAGRUDER, Colorado Springs, reported further concerning a lad of 17 years who had been shown to the society almost four years previously, on account of what was then called a Vossius ring, following an injury to the right eye by collision with the edge of a door. The patient was seen again on October 15, 1919, on account of marked inflammation of the same eye, probably an iridocyclitis. This inflammation cleared up very slowly. On December 7, a black linear object was for the first time seen lying in the anterior chamber, one end anchored at six o'clock, and the other end free and movable at about nine o'clock. No history of a foreign body having got into the eye was obtainable. On December 16 it was removed with much difficulty thru a keratome incision under local anesthesia, being finally secured by seizing it at its middle. It proved to be copper and resembled one of the fine strands of copper contained in insulated electric wire. It measured 1 cm. in length.

Iridocyclitis.

A. C. MAGRUDER, Colorado Springs, reported a case of iridocyclitis in a negress aged 41 years. The right eye had been injured seven years previously from the explosion of a coffee pot; and when the patient was first

seen on November 25, 1919, was a soft blind eye, but neither painful nor inflamed. Disturbance in the left eye was said to have begun early on November 25, 1919, and the eye showed marked signs of iridocyclitis, including adhesions of the iris to the lens, and very numerous minute deposits on Descemet's membrane. The blind eye was removed on Dec. 1, the patient having previously been placed on KI and mercurial inunctions. There was rapid improvement of the left eye, the corrected vision on December 18 being 20/20, altho the deposits on Descemet's membrane had not cleared up.

DISCUSSION. E. T. BOYD, Denver, was disposed to believe that the condition in the left eye was specific in character. It was not probable that a sympathetic inflammation would have cleared up so rapidly after the removal of the offending eye.

Remains of Hyaloid Vessels.

W. H. CRISP, Denver reported a case of persistent remains of the embryonic system of blood vessels between the optic disc and the crystalline lens, in the right eye of a woman of 29 years. The vision of this eye with correction was 5/10 plus. The eye was hyperopic almost 3 D., whereas the other eye was hyperopic about 1.25 D., the vision of the left eye being 5/3 most. The remains appeared as a black strand wavy and fairly mobile extending completely from the disc to the posterior pole of the lens.

Multiple Ulcers of Lid Margins.

W. H. CRISP, Denver, reported a case of multiple ulcers of the margins of the left eyelids in a man of 43 years, a bank clerk by occupation. The patient was wearing reading glasses which relatively undercorrected hyperopia in the affected eye, and he also had four putrescent tooth stumps. The ulcers, three on the upper and two on the lower lid margin, varied in length from about 2 to 4 mm. They were shallow, and had slightly raised red edges. The patient was first seen on November 22, 1919, when only one ulcer had formed, and the lid had been inflamed for three days.

In spite of treatment, which included optochin every hour, atropin sulphat 1 to 120 three times daily, and applications of two percent silver nitrat and later of pure nitric acid to the ulcers, no tendency to healing was definitely shown until about two days after removal of the teeth, which took place on November 25. After this improvement was fairly rapid, and a week or so later the patient volunteered the statement that he felt much better in general health than for some time past.

Bilateral Abducens Paralysis.

- W. H. CRISP, Denver, reported a case of apparently simultaneous paralysis of both external recti muscles in a woman aged 28 years. She had been delivered of a healthy first child about the beginning of November. About ten days after her confinement she developed a milk leg, and her temperature was above normal practically all the time for four weeks. Toward the end of this time phlebitis developed in the other leg in a milder degree. About four weeks after her confinement, after several days of terrific occipital neuralgia, diplopia developed rather suddenly. At the time of examination on December 19, 1919, the vision of each eye was about 5/9, improved to about 5/7 with correction. The movements of each eye were normal in all directions except outward, the right eye barely reaching the median line, and the left passing very slightly beyond the median line. The retinal vessels were slightly tortuous, the veins moderately distended. The right fundus showed one slightly narrowed crossing, the left fundus a number of short thick patches of exudate on the arteries. No distinct change could be made out at either macula. The urine was reported by the general physician to be negative.

DISCUSSION. C. E. Walker, Denver, had reported a case somewhat similar to this last spring, in a young man who was running a temperature, and in whom paralysis came on first in the external rectus muscle and then in the other, and then existed in both mus-

cles at the same time. A swelling which developed in the left temporal region was opened and drained, and subsequently the patient developed meningitis and died. The meningitis developed about six weeks after the operation on the temporal mass, and the whole case was of about six months' duration.

F. R. Spencer, Boulder. About ten years ago I saw a miner who had suffered a basal fracture, and who had an extreme convergence of both eyes about equal as regards either eye, and evidently due to involvement of the sixth nerve at the time of the injury.

Edward Jackson, Denver. The only case of clear bilateral abducens paralysis that I have seen was in a brakeman who got his head crushed between the buffers. I think it improbable that the double abducens paralysis in Dr. Crisp's case could arise from any localized lesion that would not cause other symptoms. It must be a toxic disturbance of the nuclei.

A. C. Magruder, Colorado Springs. Last summer in Colorado Springs I saw a patient who had been running a low grade temperature for some weeks, and whose eyes were crossed. The fundi were absolutely normal. About a week later I saw a notice of her death from meningitis.

W. F. Matson, Denver, recalled a case of basal fracture in which the eyes were crossed, and in which it took about a year for the right eye to swing out, while the left eye never did get beyond the median line.

Multiple Lacerations at Pupillary Border.

H. M. THOMPSON, Pueblo, reported the case of a boy of 13 years who had been hit in the left eye with a bean shot from a bean shooter. The case was unusual in that the sphincter of the iris was torn thru at intervals of about 2 mm., all the breaks in the muscle being of the same depth, and the pupil being 5 mm. in all diameters. The pupil reacted sluggishly to light and accommodation. There was also apparently a disturbance of the ciliary muscle, as the patient was unable to

read unless given a plus 2 D. sphere, altho distant vision was normal with a cylindric correction. There were two opacities in the lens, but the eye was apparently otherwise normal.

Sympathetic Iridocyclitis.

H. M. THOMPSON, Pueblo, reported the case of a girl of six years who on July 17, 1919, had suffered a severe lacerating injury of the left eye from a stone thrown by a brother at play. Enucleation was advised, but rejected by the parents. When the parents returned for the first time on August 2, the iris was of a greenish hue and the tension minus, and removal of the globe was again urged. The parents, however, returned home to Rocky Ford, and did not again report until August 14. The right eye was then slightly inflamed, there was marked photophobia, and the pupil was small and reacted sluggishly to light. At this time removal was agreed to, and was done immediately. After several weeks of moderate disturbance in the right eye, and in spite of treatment, this eye steadily got worse, the cornea and aqueous remaining clear, but the pericorneal injection persisting, the iris being slightly discolored, the pupil slowly closing, posterior synechiae forming, and the pupillary space filling with exudate. At the time of report the vision was reduced to fingers at four feet.

DISCUSSION. Edward Jackson, Denver. The majority of the cases which I have seen, and nearly all the cases which seemed to be irredeemably bad, have been in children, and the prognosis as regards sympathetic ophthalmia is much worse in children and worse in younger than in older persons. I believe that in any such case it is the duty of the practitioner to refuse treatment, if the parents will not consent to enucleation. This will give them the opportunity to get the same opinion from some one else.

W. H. Crisp, Denver, referred to a paper which had appeared in the literature concerning the influence of focal infections in these cases, and suggested as a forlorn hope that the tonsils and

other possible sources of trouble should be investigated.

C. E. Walker, Denver, had recently had a very similar experience. At his office a visiting physician from the country had used the magnet for extraction of a piece of steel from one eye, and a little later in the summer the patient came in with an iridocyclitis in the other eye. Immediate removal of the first eye was insisted upon. But altho this was promptly done the last information about the patient was that there was barely light perception in the second eye. In reply to a suggestion that iridectomy should be tried in such a case, Dr. Walker said that as soon as the iridectomy was done in this class of cases the eye at once closed down. He even believed that the condition was hurried.

Dr. Thompson. I have looked this up quite carefully, and all opinions seem against opening the eye during the time of inflammation.

WM. H. CRISP,
Secretary.

SECTION ON OPHTHALMOLOGY COLLEGE OF PHYSICIANS OF PHILADELPHIA.

January 15, 1920.

DR. WILLIAM T. SHOEMAKER, Chairman
Unilateral Choked Disc.

DR. FREDERICK KRAUS presented a case of unilateral choked disc in a ten-year-old boy. When first seen the right eye was blind with immobile pupil, except consensual reaction to light.

The disc was swollen about 6 diopters, with small hemorrhages, the other eye having a filled-in disc, rather too gray in tint. The swelling gradually disappeared, showing a membranous semitransparent mass lying across the disc at an angle of about 105 degrees, and a considerable area of choroiditis to the outer and lower side of the disc for about 1 and 2 disc diameters respectively. The vision is now 15/70, with a much flattened field. The opposite eye has a concentrically contracted field. The Wassermann test was negative, but improvement followed large

doses of iodid of potassium, so that a possible specific etiology was suspected.

Symmetric Macular Degeneration.

DR. BURTON CHANCE described the fundi of a man and his sister in which the macular regions were symmetrically affected. The lesions were discoid and rather sharply outlined from the surrounding retina by pigmented borders. In none of the eyes were there gross lesions elsewhere. The subjects were healthy Americans. Marked color vision defects were manifested by each. The man was slightly day-blind and had a convergent strabismus of low degree. The woman manifested an intermittent nystagmus. These cases are reported in full in this JOURNAL, v. III, p. 241.

Hole in Disc with Bridge Coloboma of Choroid.

DRS. T. B. HOLLOWAY and A. J. BERTRAM (by invitation) exhibited a patient, F. V., aged seventeen years, who first came to the Wills Eye Hospital, October 8, 1919. The patient came to this country from Russia when six years of age. Prior to that time he vaguely remembers that his eyes were not perfect, but the first positive deficiency he recollects was when he reached quarantine in New York in 1908. His family history is negative.

Right eye: Cornea, iris and pupil negative. The disc is of somewhat irregular contour, the lower half showing a well-defined, broad groove, which slopes outward. Near the lower and outer margin of the disc in the grooved portion there is a characteristic hole, the outer border of which is somewhat pigmented, having a gray-green tint. A tiny vessel curves over the outer margin of the hole while two thread-like vessels can be noted coursing across the bottom. The depth of the hole is 3 D. The vessels emerge eccentrically from the disc up and in at the junction of the upper third and lower two-thirds. The capillarity of the disc is fair, except in its lower half, which is rather pale. At an apparent distance of about 11 mm. below the margin of the conus, or of the partial

coloboma at the nerve entrance there is a large disc-sized area of choroidal disturbance; this is a sharply circumscribed lesion. At an apparent distance of 11 mm. below this lesion can be noted the apex of a typical coloboma extending as far forward as the eye can see.

Left eye: Widely divergent. Cornea clear; the iris shows a well-defined, coloboma at seven o'clock. In the lens there is a well-defined, vertical rectangular opacity, $7 \times 4\frac{1}{2}$ mm. in size, in which can be noted possible calcareous changes. The lens has undergone partial absorption, and bridging across from the ciliary region to the lenticular opacity, are several pigmented strands. Beyond the dense opacity above described less involved lens material can be noted on the temporal side and below. Between the lens remains and the ciliary region on the nasal side one can get a poor view of some of the fundus structures and can note a large area extending downward and slightly inward, which gives rise to a reflex similar to that noted in cases of coloboma.

No operation was performed on the left eye and there is no definite history of trauma. The vision of the right eye is 6/9, of the left, L. P.

Concerning the hole in the disc, it was pointed out that this was situated in a groove in the portion of the disc usually affected. In referring to the etiology reference was made to the previous case report published by Holloway.

They referred to the classification of colobomata as cited by Coates, and felt that it was impossible to positively say whether a coloboma of the nerve existed in this patient, agreeing with von Hippel that ophthalmoscopic examination in these cases is not reliable in determining the pathologic anatomy involved. They called attention to the unilateral coloboma of the iris, not the slightest evidences of a defect being present in the right eye.

Bilateral Colobomata of Iris and Choroid.

DR. T. B. HOLLOWAY exhibited and referred to the history of W. D., aged

twelve years, who first came to his clinic at the Wills Eye Hospital, August 25, 1919. The child's mother stated the eyes were known to be defective since birth. The irides were of piebald type. There was a mixed nystagmus. The child preferred to fix with the left eye.

Right eye: There is a coloboma of the iris directed down and slightly in, 2.5 mm. in width. Several delicate opacities can be noted in the lens. A few delicate zonular fibers can be noted below, stretching between the notched border of the lens and the ciliary body, but they are deficient in numbers. Examination of the fundus reveals a large coloboma, the apex sweeping just above the disc, the position of which is best determined by the emerging vessels. The course of the vessels is very irregular here and there, showing marked dipping. There are vague splashes of delicate pigmentation over the colobomatous area. An unusually large number of vessels can be noted coursing over the colobomatous area well toward the periphery; doubtless so-called scleral vessels.

Left eye: In the iris, directed down and in, there is a coloboma measuring 2 mm. in width. The lens shows the same characteristics described for the right eye, except that no zonular fibers could be noted except at the extreme angles of the colobomatous area. As in the right eye a few vitreous opacities could be seen. The coloboma of the choroid is of the same character as that described for the right eye.

Dr. Holloway referred to the occasional rotary movements of the head that occurred when the child attempted to read. He called attention to the vague or uneven character of the surface and referred to the ectasia that could be noted in one eye. He stated that he had never seen a case in which so many vessels coursed over the affected area.

New Pupillometer.

DR. T. B. HOLLOWAY stated that until recently he had never found a satisfactory clinical instrument for measuring pupils. A year or more ago he had

made a tentative design of what he though might prove of service. Recently he chanced to see a cut of an ordinary optician's lense gauge, which coincided to a marked degree with his previous ideas concerning a pupillometer. One of these instruments was obtained and has been used by him for several months. No modifications have been made except, as an experiment, the tips of the instrument were enamelled, thinking that it might give rise to a greater contrast between the tips of the instrument and the underlying iris. He pointed out that the instrument was not only of service in accurately measuring the size of the normal pupil, which can be determined to a tenth of a millimeter, but that it was of the utmost value in determining the dimensions of oval or irregular pupils. It was likewise of the greatest service in making linear measurements on the globe or of lesions on the lids, also to determine the width of the palpebral fissure in cases of ptosis. He pointed out the splendid balance of the spring in the instrument, which was delicate enough for fine adjustment and yet stiff enough to permit rather free handling without changing the position of the indicator. He realized that a millimeter scale placed nearer the tip of the instrument would be of advantage, but the same degree of accuracy would not be obtained. Therefore he had been using the instrument exactly as it came from the shop, except for the enamelled tips, and had found it the most satisfactory instrument for the purpose above described that he had ever used.

Fortunately it was an instrument that was used by practical shopmen, and, as a consequence, could be purchased for a price that was consistent with its actual value. In other words, it was free from the exorbitant price charged by most instrument makers.

History, Day-Book and Ledger Cards.

DR. S. LEWIS ZIEGLER brought up for discussion the subject of history, day-book and ledger cards. He thought that the practical side of one day's daily routine deserved more careful

consideration than was usually accorded it. He described the system that he had used for twenty-five years past and asked for suggestive criticisms and descriptions of other methods used by the Fellows. His history card measures $6 \times 6\frac{3}{4}$ inches, and contains at the top a skeleton outline covering the routine items always recorded, viz., "No." "Date." "Name." "Residence." "Age." "Occupation." "Referred by." "Charge." "Duration." "Vision." "Accommodation." "Heterophoria." "Power of Muscles." "Glasses Worn." "History of Ophthalmoscopic Examination, Refraction, etc." A date column is ruled at the left side and the surgeon's name and address is printed in small type at the bottom. For lengthy histories supplementary cards are provided, having only a top line for name and a left marginal ruling for date. Fields, laboratory findings and other data are attached by clips to the history cards, separately or in manila envelopes. The cards are made by the Library Bureau of Boston.

He called attention to the need of keeping accounts for physicians in a manner that was convenient and met legal requirements. He had always used a combined day-book and ledger, which is a unit in itself. The pages are ruled with a wide space at the left side for the patient's name and address. This wide space is then subdivided into a three-line space running thru each day of the month, comprising debits, remarks and credits, arranged thus:

DR.
RMKS.
CR.

The daily charge and the daily credit are then entered up and an abbreviated description or code word of the operation or treatment is inserted in the square interspace between the figures. At the end of each month the total debit and credit are carried forward

and a balance struck, from which bills can be sent out. Columns for these totals and balances are ruled at the extreme right of the page. It is optional whether these debits and credits shall be transferred to a small ledger card (3×5 inches), but it is very convenient to do so. It is also optional whether a compact bill-book shall be used or not, but this is also a most convenient form of making a rapid review of one's outstanding accounts.

This day-book and ledger has stood the "acid test" by being submitted to the Orphan's Court. The method was approved, the account confirmed and judgment awarded without argument or dispute. The book is made by Hoskins & Co., of Philadelphia.

He had always used a book of 400 pages, 14 names to the page, which was somewhat cumbersome to handle. He now proposed to use a loose leaf system of 200 pages, 13 names to the page, which would be more convenient. The pages, however, must be numbered in pairs to indicate their continuity. Thus, page 15 for the first half of the month would be opposite page 15 for the last half of the month. The surgeon's name should be printed at the bottom of each page to convey its identity.

The legal requirements are that the original entry shall contain names entered in sequence and that each charge shall be entered in figures instead of by code or check mark. Card systems for individual names are not legal. It behooves the profession to put its bookkeeping on a legal basis and insist on payment, just as the grocer or merchant does. The laxness of one injures the prosperity of all. Patients who do not pay cash should not be allowed to escape payment of a just bill for services rendered.

J. MILTON GRISCOM, M.D.,
Clerk.

ABSTRACTS

F. Moreau, Alternating Pseudosyndrome. *Ann. d'Ocul.*, 1919, v. 156, p. 151.

Under this title, Moreau, reports a case of fracture of the skull accompanied by left hemiplegia, right incomplete facial paralysis with ptosis, right exophthalmos and immobile eyeball, slight conjunctival and palpebral ecchymosis, hydrops, with complete loss of pupillary reaction and vision, hemorrhage covering the nerve head. No loss of consciousness. Later loss of sensation of cornea and conjunctival, with myosis and doubtful reaction to light. The exophthalmos disappeared, and there was progressive amelioration of the immobility of the eyeball. The author believes that there was an antero-posterior fracture of the skull on the right side, terminating in the optic

anal. A subdural hemorrhage by compression caused the left hemiplegia and entered into the sheath of the optic nerve causing the ocular symptoms.

C. L.

Fernand Lemaitre and Maurice Brémond. Mucocoele of the Ethmoid. *Ann. d'Oculist.*, 1919, v. 156, p. 475.

The authors report a case in a soldier, 19 years old. There was a large round mass, 3.5 cm. high, extending from the median line to the left eyeball. The latter was displaced temporally about 2 cm. and anteriorly about 2 cm. Palpation showed a hard resistant mass. From the radioscopic and rhinologic examinations, a diagnosis of ethmoidal sarcoma was made. Operation, however, revealed a mucocoele of the ethmoid, a rare condition.

C. L.

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AMERICAN JOURNAL OF OPHTHALMOLOGY, 7 West Madison St., Chicago, Ill.

THE INTERNATIONAL OPHTHALMOLOGICAL CONGRESS.

With the report made and adopted at the New Orleans meeting, the movement for a world Congress on Ophthalmology has taken definite shape; and has entered upon the stage of active development and preparation. The time suggested for it, April, 1922, leaves the period for preparation short enough, for there is much to be done.

Washington, where the Congress is to be held, is in many ways the American city best adapted for such a gathering. But it is expected that the guests who come from other countries to attend the Congress will be entertained in many of our cities, and will see something of America's material progress, resources, and scenery. It is time for American ophthalmologists to get busy. Some of the preparations for the Congress must begin at once, and be pushed vigorously to achieve the best results.

First we can support the Congress by joining it. The expense it must entail has already begun. A wide correspondence, both domestic and foreign,

must be carried on, to extend the necessary invitations, and effect the preliminary arrangements. The member who now sends in his membership fee (ten dollars) in the Congress, will not regret that it is paid; and he will help when the help is most needed. He will, too, receive the bulletins that will from time to time be issued, keeping him in touch with what is being done in this organization in which all ophthalmologists, particularly those of America, should be actively interested. Probably no greater help could be given the Secretary of the Committee when he goes abroad next month, to attend the Oxford Ophthalmological Congress, than to enable him to announce that more members have already joined the Congress than the total attendance at the only other International Ophthalmological Congress held in America, at New York City in 1876.

Those who propose to offer papers for the Congress have little enough time to prepare them. The subject should be selected at once, all the available literature bearing upon it should be read, and the experiments that may

settle points that would otherwise remain in doubt must be made. The first reading will be likely to open up a much wider range of related literature than had before been supposed; or some important article may prove very hard to get. The experiments may have to be modified and repeated, or may require much more time than was at first expected. Pathologic specimens and slides may only yield the most valuable lessons when carefully restudied, after a considerable period of thought and investigation; or a sound judgment can be passed on them only after other specimens and slides have been studied, with equal care and thought.

The paper may not take five minutes to read; but its importance, the respect it will secure for its author, the permanence of its place in the literature, the benefit it will confer on the profession will depend on the breadth of reading, the depth of thought, the months and years of effort that have gone to its preparation. For any paper that is worth writing the actual time and labor spent upon its composition is only a minute fraction of the time spent upon preparation to write.

Even by those who only expect to discuss a paper, the same kind of preparation should be made. As the subjects for discussion are announced in the bulletins of the Congress, those interested should take up systematic reading on these subjects, should go to their case records and carefully endeavor to trace the later history of these cases; and should be able to present in their discussion accurately ascertained final results. The scientific success of our Congress, the importance of the place it will occupy in the history of ophthalmic progress, depend on the careful preparation made for its scientific proceedings, in the two years that are to elapse before it convenes.

A third kind of preparation, that will contribute greatly to the satisfaction of those who make it and also to that of our visitors, is study of the languages that will be used in the Congress, and in the volumes of its transactions. The "official languages"

of the Congress will be English, French and Spanish. That means all papers and remarks in discussion, that will be published in the Transactions of the Congress, will have to be translated into one of these languages. Other languages also will be heard in the discussions.

It is quite possible for even a busy ophthalmologist in two years to get a good reading and listening knowledge of one of these languages, and even to master it so as to be able to communicate rather easily with a visitor who is wholly dependent upon it. The study of a language is so totally different from the ordinary care and worry of practice, that it will be felt as a recreation rather than a task to one who is interested.

To carry on this kind of study one should get a good grammar, should have lessons from some one who speaks the language; and should undertake to do some ophthalmic reading in it, to become familiar with the special words and phrases with which he is concerned. For the latter purpose the leading ophthalmic journals, particularly those that give considerable space to review matter; or a good recent text-book on ophthalmology in the language studied, will be of greatest service. Where there are two or three ophthalmologists living in the same town, they can take up the language study together; and will find it yet more interesting and valuable. This kind of preparation is not to be made for the Congress alone. The very moderate command of another language is preparation for communion with foreign colleagues, for travel abroad, for interesting and profitable reading thruout life.

The Committee to arrange for the International Congress has selected the following as its officers: Chairman, George E. de Schweinitz of Philadelphia; Secretary and Treasurer, to whom membership dues should be sent, Luther C. Peter, 1529 Spruce street, Philadelphia. Chairman of Sub-Committees: Finance, William H. Wilmer, Washington, D. C.; Organization, Edward C. Ellett, Memphis, Tennes-

see; Membership, Walter R. Parker, Detroit, Michigan; Scientific Business, Edward Jackson, Denver, Colorado.

The membership and organization of the various committees, both general and local, will probably be announced in a bulletin regarding the Congress at an early date. The undertaking is well begun, it is an important one, the time is short for what has to be done. Let us get to work and make the International Ophthalmological Congress of 1922 a scientific success, that will win respect for ophthalmology as studied and practiced in America; both from ophthalmologists thruout the world and from the general public, that too often fails to discriminate between the scientific worker and the charlatan. Let the committee know soon who in each city are actively interested, ready to join in the Congress, and to work for its general success, and the entertainment of foreign visitors who may visit that city or region.

E. J.

CATARACT OPERATIONS.

The series of papers published in our April number, dealing with questions regarding operations for cataract, illustrates the present thinking of ophthalmic surgeons about problems that have claimed a large share of the attention of their predecessors for 250 years. Nearly all the forms of cataract knife that have since been advocated by men whose names were employed to designate them, were used and described by the first generation of operators who followed Daviel. Yet they still continue to be forgotten, re-invented and tried again.

The fact seems clear that there are many slightly differing modifications of technic, any one of which may be adopted with success. Having mastered one of them and used it well, the surgeon should adhere to it and be slow to change. Having thought out his plan, and gained the skill in using it that comes only with actual practice, let him not give it up at the behest of the latest article describing a new (?) modification. Possibly among the

large number of methods advocated a few will finally be judged better than his own; but for him, and his patients, the plan he has made his own by mastering it, will always be best.

Proposed variations in technic may be judged, however, by certain principles that are fairly well established. A simple technic is always to be preferred. This is often forgotten among the claims of novel and "improved" methods. The first question to be asked about a modification is, does it make the procedure more simple? If it does not, it should be regarded with skepticism. This claim of simplicity is the strong one put forth in one of the papers of the series referred to. Next after simplicity we would rank a smooth incision, then the conjunctival flap to guard against infection, and in general the least incision compatible with avoidance of bruising the tissues.

The discussion of special modifications and procedures is endless. It will go on wherever a paper on cataract operations is read before a society. We will not here enter upon it. But it needs to be reiterated that certain general surgical principles should dominate all plans. They must not be lost sight of in the enthusiasm for what is supposed to be new, and is hoped to be better; and within wide limits individual skill is more important than any special method.

E. J.

BOOK NOTICES.

American Academy of Ophthalmology and Otolaryngology. Transactions of the Twenty-fourth Annual Meeting. 8 vo. 484 pages. Illustrated. Clarence Loeb, M.D., Editor. Published by the Society.

About one-half of this volume is given to the 21 papers and discussions on subjects relating to ophthalmology. Several of these papers, and an abstract of the discussions are published in this Journal, as original papers and under the heading of Society Proceedings. They compare well with similar transactions of other societies, both as to novelty and practical importance.

The operative side of ophthalmology is particularly well represented.

The outstanding feature of the present volume, as compared with its predecessors, is the abundance of excellent illustrations. Some of the half-tone reproductions are exceptional, both for their artistic beauty and for the clearness with which they demonstrate the points they are intended to illustrate. Even the crude diagrams tell their story more briefly and clearly than any verbal description. A new departure, for these transactions, is the color plate representing Dr. Love's case of cysticercus in the vitreous.

This volume contains in addition to its scientific proceedings and lists of officers: the minutes of the annual meeting, the Honor Roll of members who served in the late war, and lists of its members arranged both alphabetically and geographically. All these add to its current interest, and to its future value as a book of reference. The Editor is to be congratulated on the early appearance of this volume, less than six months from the date of the meeting, and on its excellent makeup. E. J.

Section on Ophthalmology, A. M. A. Papers to be Presented at the New Orleans Meeting. April 28-30, 1920. 8 vo. 225 pages, illustrated. Chicago, American Medical Association.

This paper-backed volume is unique in medical literature, both because it is a true pre-session volume; and because it is an instance of free distribution of the highest class of medical literature. It is printed by the American Medical Association and the authors of the papers; and given, post-paid, to those who receive it. The way to get it is to become a member of the Section on Ophthalmology, and attend its meetings at least once in five years, and register.

It is put out for the use of the members at the session. Of the 15 papers here printed we are supposed to say nothing. They are to be published later in the Journal of the A. M. A. and the Transactions of the Section. But we will venture to remark that they

are all of high scientific value, and deal with topics likely to arouse interesting and valuable discussions, which will increase the importance of the Section Transactions. Their subjects are already announced in the program for the New Orleans meeting.

The introduction of blank leaves for memoranda makes this volume very convenient for use in the meetings. Its full value will only be appreciated by those who bring it with them. We urge all readers to get on the section mailing list, by attendance at the New Orleans meeting. E. J.

The Eye, Ear, Nose and Throat, edited by Casey A. Wood, M.D., D.C.L.; Albert H. Andrews, M.D.; George E. Shambaugh, M.D. Practical Medicine Series. 1919. 384 pages, illustrated. Chicago. "The Year Book Publishers."

Annually we welcome the Practical Medicine Series; particularly the volume on the Eye, Ear, Nose and Throat.

On each subject only the high lights are given. The ocular signs and symptoms of systemic and neighboring diseases are given preferential space, as is also Military Ophthalmology. Of these as prominent subjects, the reviewer is struck with Wyler's advocacy of canthoplasty in trachoma, the resort to which is comparatively often made in his own practise, disciform keratitis, focal infections, optic neuritis from nasal sinus disease, and the ocular muscles, toxic amblyopia. The ocular symptoms of general diseases, together with pages on injuries of the Eye and Military Surgery are other noteworthy abstracts.

To the diseases of the Ear, Nose and Throat is given the balance of the book. H. V. W.

A Practical Treatise on Ophthalmology. By L. Webster Fox, M.D., L.L.D. New York and London. D. Appleton and Company.

Of text books on the eye we have quite a few, the larger number being published in the English language, the majority by Americans, and a goodly portion of these arising from the "ca-

cothesis scribendi Philadelphiaenensis." To this good natured gibe at the activities of medical authors in the City of Brotherly Love, it may be added that these are of the best and among them is that of Fox.

This is a book which may be followed with safety, as it condenses the present knowledge of ophthalmology within the covers of a schoolbook, yet allows the author's individuality to show thruout its pages. We grant Fox a large experience and have followed his teachings for three decades with profit. The student may do no better!

The scheme of the work is classical, giving chapters on anatomy and physiology, bacteriology and general diseases having ocular lesions or symptoms, eye muscle imbalance and refraction comprehensive enough to give a working basis for the student.

The illustrations are largely original and of good quality. Those dealing with specific lesions are mostly from the author's practise. In describing operations weight is given to the ones preferred by the author, among them a number devised by him. Exactness of detail will be noted even to the proper method of holding instruments, which is shown a la Landolt in pictures of the surgeon's hands. The work is good and is recommended for a text book.

H. V. W.

Symptoms of Visceral Disease in Its Relations to Clinical Medicine. Francis Marion Pottenger, M.D., L.L.D. 328 pages. 86 text illustrations. 9 colored plates. St. Louis: V. C. Mosby.

In this book is given the interpretation of visceral neurology, a study of visceral disease from the important standpoint of the patient. It is an attempt to show how pathologic changes in one organ affect others, and the organism as a whole thru the medium of the visceral nerves, to which the author gives the name of the Vegetative Nervous System. An understanding of this system, and the activities of the endocrin glands will explain to the clinician most of the physical activities connected with the visceral func-

tions. This is an attempt to show the relationship between physiologic facts and clinical observation.

Six pages are given to the influence of the sympathetic nerves on the eye, with numerous references to the eye thruout the body of the text.

H. V. W.

Medical Vademecum, in German and English. B. Lewis, Vienna, with preface by A. Politzer. 2nd ed. 559 pages. Vienna, B. Lewis.

Those of us not fully cognizant of colloquial German who had the opportunity to attend the Vienna clinics were materially helped by certain brochures and books published in both English and German. It has always been the writer's opinion that a large proportion of the professors at the German universities obtained most of their living from the fees paid by foreign students. For forty years Vienna was in the lead in the clinical advantages furnished post graduates in some branches of medicine and particularly so in Ophthalmology. Surely the want of American students since the beginning of the Great War has put the teaching faculties into the discard, from which they may never recover. The glamour of "study" in Europe no longer attracts the medical man and we may say that it is hardly now necessary for a finish to the student's career. The two books here reviewed are no doubt German propaganda, attempts to attract young Americans to the old Krankenhaus again,—where a few hours a day may be spent looking at sore eyes and dissertations thereon,—the balance in the Bierstube.

This bound book contains on the lefthand pages the German text, and on the right the translation into English; the latter a very good "ubersetzung" too. The subjects discussed are mainly clinical lectures in general medicine, the ones on the Nerve Tracts of the Central Nervous System by Marbourg, and on Diagnosis of Inflammatory Affections of the Cornea by Meller, being of direct interest to the oculist. These take up 241 pp., 149 pp. being given to colloquial Ger-

man with Histories. Tests, Examinations, Operations with Instructions to Patient and Assistant. Among these are the History of a case of Cataract with Operation, Testing of Vision, The Visual Field, The Astigmometer. The balance of the book is given up to examinations by means of chemical and microscopic methods which are up to date for all routine work.

The book is commended to those who do not read German well, and for use to students who may desire to go to Europe. H. V. W.

Vademecum for Otologists, by B. Lewis, Vienna, with preface by A. Politzer. Vienna, B. Lewis.

A paper covered book of 205 pp. con-

taining articles pertaining to otology by various authors, the purpose being to make as easily accessible as possible to German and English otologists the medical vocabulary of both languages. The preface of 115 pp. consists of 7 lectures, the one by Barany on Dizziness and the semicircular canals of decided interest to the ophthalmologist. The balance of the book is devoted to Histories, Tests, Examinations, Advice and Operations with Instructions to Patient and Assistant, in German and English on opposite pages, of value to the English speaking student in Germany. H. V. W.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities.

DEATHS.

Dr. Michael Behrman, Covington, Ky., died recently.

Dr. Augustin Chacon, Mexico, died Oct. 9, 1919.

Dr. Reginald Evershed, Hampstead, England, died Jan. 25, 1920, aged 55 years.

Dr. Edgar Lee Lindsey, Fort Smith, Ark., died March 8th, from pneumonia, aged 33.

Dr. W. T. Montgomery, Chicago, and Evanston, Illinois, died in Evanston, March 25th, 1920, aged 76.

Dr. James Pinkerton, West Kirby, England, died Feb. 16, 1920.

Dr. Barton Pitts, St. Joseph, Mo., died March 10th from heart disease, aged 60.

Dr. Frederick T. Reyling, Kansas City, Mo., died at his home Feb. 24th, 1920 from pneumonia, aged 59.

Dr. Samuel Doty Risley, Philadelphia, aged seventy-five, died April first, following a nervous collapse. Dr. Risley was one of the very prominent ophthalmologists of this country. He was Chairman of the Section on Ophthalmology of the A. M. A. in 1893; and a member of the House of Delegates in 1907; President of the American Academy of Medicine, in 1891; President of the American Ophthalmological Society in 1907; President of the Ophthalmological Section of the College of Physicians of Philadelphia in 1904; Lecturer and Assistant Surgeon in Ophthalmology in the University of Pennsylvania from 1872 to 1879; Professor of Diseases of the Eye in the Philadelphia Polyclinic from 1886 to 1900, and Emeritus Professor thereafter; Attending Surgeon to Wills' Eye Hospital since 1889; a member of the board of managers of the Pennsylvania Training School for Feeble-Minded; Alumni manager of the University of Pennsylvania Hospital since 1896. His death is a great loss to the ophthalmic profession of the world.

Dr. W. K. Rogers, Columbus, Ohio, died Feb. 27th, 1920.

Dr. E. M. Whitney, New Bedford, Mass., died Feb. 27, 1920, aged 64.

PERSONALS.

Dr. Casey Wood has been elected Foreign Corresponding member of the Sociedad Oftalmologica Mexicana.

Dr. J. F. Dickson of Portland, Oregon, was a San Francisco visitor during the early part of April.

Dr. L. M. Harris, till lately a general practitioner of Superior, Wisconsin, has returned from a course of study on the eye, ear, nose and throat, and now is a specialist on those branches in the same city.

At a recent meeting of the New York State Medical Society, Dr. William Zentmayer of Philadelphia, opened the discussion upon papers by Drs. Duane and Thomson upon "Anomalies of Binocular Balance."

Dr. F. E. Woodruff, of St. Louis, has been appointed Chairman, and Dr. John Green, Jr., St. Louis, Secretary of the Consulting Staff of Oculists of the Missouri Council for the Blind.

Friends of Dr. Thomas Hall Shastid will be pleased to learn that he has so far recovered his health that he intends returning to practice. He will, however, continue to reside at Superior, Wisconsin, and his work will be confined to consultations and expert testimony in the field of the eye, ear, nose and throat.

At a recent meeting of the College of Physicians of Philadelphia, which was held as a memorial to the late Dr. Horatio C. Wood, Professor of Therapeutics, Materia Medica and Toxicology of the University of Pennsylvania, the principal address of the evening was delivered by Dr. George E. de Schweinitz of Philadelphia.

Madrid Correspondence speaks with great enthusiasm of Prof. Fuchs' work in Spain: "The case of Fuchs, who has always kept apart from all hatred, being a soldier only in the army which fights pain and disease, is tragic. An old man after retiring from his profession, and no longer able to replace what he has lost, he has been compelled to to abandon his country, bid goodbye to his family, and accept the offer of a few lectures. Still this scientist puts into his course an enthusiasm and we may say love which is full of life, and he demonstrates his anatomic specimens with so much pleasure and fervor that he seems to forget himself and rises to the serene heights of science." *Jour. A.M.A. v. 74 p. 961.*

SOCIETIES.

The Society of Ex-House Surgeons of the Manhattan Eye, Ear and Throat Hospital gave a dinner on the evening of April 17th in New York.

The Section on Ophthalmology of the New York Academy of Medicine on April 15th devoted the evening to a paper by W. Holland Wilmer of Washington, D. C. on "The Injurious Effects on the Eyes of the Various Toxemias."

The Medical Society of the State of California will meet in Santa Barbara, on May 11-12-13. Ophthalmology will play an important part in the program, as the titles of the papers to be presented are of unusual interest.

The annual meeting of the Ophthalmological Society of the United Kingdom was held on April 29-30 and May 1st. Two of the principal papers discussed were "Diabetes in Relation to Diseases of the Eye," and "The Prevention and Treatment of Ophthalmia Neonatorum."

At the regular meeting of the Chicago Ophthalmological Society April 19th, 1920, papers were read by Dr. Oscar Cleff on "Cyst of the Iris," and by Dr. George F. Suker, on "A Simple yet Effective Muscle Shortening for Strabismus."

The Oxford Ophthalmological Congress will assemble at Keble College, Oxford, England, on the evening of Wednesday, July 14th and will continue over Thursday and Friday following. Dr. Luther C. Peter of Philadelphia will open a discussion on "Perimetric Methods." The Doyle Memorial Lecture will be delivered by F. Richardson Cross, Esquire, J.P., L.L.D., F.R.C.S., the subject being "The Nerve Paths and Centers Concerned with Vision."

MISCELLANEOUS.

Thirty cases of poisoning and two deaths, supposed to be the result of canned salmon, have occurred in a New York prison. Partial blindness was one of the symptoms.

The New York Post-Graduate School is conducting a campaign for a large endow-

ment, a part of which is to enlarge the Department of Ophthalmology both in the teaching and hospital sections.

The first volume of the medical history of the world war, which deals with the hospitals of the United States, and was written by Dr. Casey Wood, is now completed and ready for the press. The entire history will comprise about twenty volumes.

The Journal of Ophthalmology, Otology and Laryngology, edited by Dr. G. W. Mackenzie of Philadelphia, has resumed publication after a number of months' suspension during the war. This journal is the official organ of the American Homeopathic Ophthalmological, Otological and Laryngological Society.

A new edition of Dr. L. Webster Fox's "A Practical Treatise on Ophthalmology" has just been published. The book contains six colored plates and three hundred illustrations. All sections of the book practically, have been revised, and the new points in diagnosis and methods of treatment have brought the work up to date in every detail.

The Permanent Blind Relief War Fund has been aiding the blinded soldiers and sailors of the Allies since 1916 and has given one hundred thousand dollars toward the rehabilitation of our own boys through the Red Cross Institute for the Blind at Baltimore. It cannot stop now, like many war organizations, because there remain between one and two thousand blinded soldiers in France, over one thousand in Italy and hundreds in the occupied countries, such as Belgium, Serbia, Rumania and Poland, who still must be cared for. The Fund has been incorporated with a view to insuring its permanency and rendering it self-sustaining through the income of annual membership subscriptions. Associate membership is ten dollars, membership twenty-five dollars, sustaining member one hundred, life member five hundred, patron one thousand and benefactor five thousand. Charles L. Hutchinson is the treasurer, 1502 Monadnock Block, Chicago.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colo.

DIAGNOSIS

- Angelucci, A.** Simulation. *Ann. di Ottal.* v. 25. Abst. *Arch. d'Ophth.*, v. 37, p. 190.
- Clapp, C. A.** Diagnosis of Arteriosclerosis from Ocular Standpoint. *Med. Rev. of Rev.*, v. 26, p. 147.
- Druault, A.** Tables for Estimating Lowering of Visual Acuity in Both Eyes. (6 tables). *Arch. d'Ophth.*, v. 37, p. 162-167.
- Peter, L. C.** Value and Limitations of Perimetric Methods of Study. *Amer. Jour. Physiol. Optics*, v. 1, Jan., 1920, p. 56-66.
- Vogt, A.** Focal Illumination. *Münch. med. Woch.*, v. 66, p. 1369.

THERAPEUTICS

- Heimann, E. A.** Use of Sprays in Ocular Disease. *Therap. d. Gegenw.*, v. 60, p. 459.
- Hochgurtel, M.** General Intoxication after Instillation of Atropin. *Zeit. f. Augenh.*, v. 41, p. 227. Abst. *Clin. Opht.*, v. 24, p. 36.
- Levin, L.** Technic of Radium Application in Cataracts. *Amer. Jour. Radiol.*, v. 7, p. 109.
- Parenteral Injection of Milk in Eye Diseases.** *Rev. de Med. y Cirug. Prac.*, v. 125, p. 329.
- Possek.** Poultices in Ocular Disease. Abst. *Clin. Opht.*, v. 24, p. 89.
- Schorn.** Collargol in Ophthalmology. *Deut. med. Woch.*, 1919, No. 30. *Clin. Opht.*, v. 24, p. 42.
- Severin.** Tetrahydroatophan. *Berl. klin. Woch.*, 1918, No. 35. *Clin. Opht.*, v. 24, p. 89.
- Szily, P. v. and Steinberg, A.** Bacteriotherapy and Chemotherapy in Ocular Disease. *Klin. M. f. Augenh.*, Feb., 1919. Abst. *Arch. d'Ophth.*, v. 37, p. 181.
- Van den Felden.** Parenteral Injections of Milk in Ocular Disease. *Berl. klin. Woch.*, 1919, No. 21. *Clin. Opht.*, v. 24, p. 83.
- Repeated Titles.** **Darier.** (3, p. 156) *Brit. Jour. Ophth.*, v. 4, p. 193. **Pauly** (3, p. 156) *Brit. Jour. Ophth.*, v. 4, p. 194. **Terrien** (3, p. 237) *Brit. Jour. Ophth.*, v. 4, p. 192.

OPERATIONS

- Lawford, J. B.** Method of Iridotomy. *Brit. Jour. Ophth.*, v. 4, p. 199.
- Nadal, R.** Bandage after Wounds and Operations. (1 ill.) - *Anales de la Soc. Mex. de Oft. y Oto-Rino-Lar.*, Feb., 1920, p. 38.

REFRACTION

- Cantonnet, A.** Presbyopia. *Rev. gen. de clin. et de Therap.*, v. 33, p. 449.
- Fehr.** Testing Eyes for Glasses. *Therap. der Gegenw.*, v. 60, p. 416.
- Gonzalez, J.** Presbyopic or Adynamic Astigmatism. *Med. Ibera*, v. 9, p. 186.
- Gould, G. M.** Eyestrain in Relation to Occupations. *Amer. Jour. Physiol. Optics*, v. 1, Jan., 1920, p. 15-40.
- Jackson, E.** Changes in Refraction with Age. *Amer. Jour. Ophth.*, v. 3, p. 228.
- Jones, E. L.** Disturbances of Heart and Liver with Low Grades of Astigmatism. *Tr. Amer. Acad. Ophth. and Oto-Laryngol.* 1919, p. 209.
- Newcomb, J. R., and Larkin, B. J.** Effect on Accommodation Produced by Cycloplegics in General Use. *Tr. Amer. Acad. Ophth. and Oto-Laryngol.* 1919, p. 179-197.
- Woodruff, F. E.** Determination of Axis in Astigmatism. (Dis.) *Amer. Jour. Ophth.*, v. 3, p. 222-224.

OCULAR MOVEMENTS

- Banister, J. M.** Practical Considerations in Connection with Insufficiency of Convergence of Visual Axes. *Tr. Amer. Academy of Ophth. and Oto-Laryngol.* 1919, p. 197. *Amer. Jour. Ophth.*, v. 3, p. 269.
- Baudouin and Lantuejoul.** Motor Troubles and Zona. *Gaz. des Hop.* 1919, No. 82. *Clin. Opht.*, v. 24, p. 99.
- Dolman, P.** Relation of Sighting Eye to Measurement of Heterophoria. *Amer. Jour. Ophth.*, v. 3, p. 258-262.
- Dor, L.** Vertical Diplopia and Anisometropia. *Clin. Opht.*, v. 24, p. 47-50.
- Fleisch, J.** Physiology and Pathology of Ocular Deviations. *Monatschr. f. Psychiat. u. Neurol.*, v. 45, p. 300.
- Griffith, C. R.** Decrease of After Nystagmus during Repeated Rotation. *Laryngoscope*, v. 30, p. 129, 138.
- Llewellyn, T. L. and Elworthy, H. S.** Illumination of Mines with Particular Reference to Miners' Nystagmus. *Brit. Jour. Ophth.*, v. 4, p. 155-187, and 189.
- Malagodi, A.** Third Nerve Nucleus and Muscles Innervated by this Nerve. (Weber's Syndrome). *Riv. di Patol. Nerv.* v. 24, p. 99. Abst. *Arch. Neurol. and Psychiat.* April, 1920, p. 442.

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396



PSEUDO TUMOR OF CHOROID. (JACKSON)

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PSEUDOTUMORS OF THE UVEAL TRACT.

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With report of two cases simulating uveal sarcoma are here associated brief notices of other cases, numbers of which are to be found in the literature. It is concluded that eyes retaining useful vision should be observed until a positive diagnosis can be made, altho an eye needlessly sacrificed for the individual may be very valuable to science.

Tumor, which originally meant any swelling, has come to have a restricted meaning, that is hard to define, but quite definite in its common use as more or less synonymous with neoplasm. In this sense the most important tumor of the uveal tract is sarcoma; altho carcinoma and angioma are not excessively rare. The differential diagnosis between these, and tuberculoma, syphiloma, hematoma, and inflammatory swellings is of practical importance. For the former, local measures, excision or possibly applications of X-rays or radium are essential; for the latter appropriate general treatment is to be considered.

In the diagnosis of glioma, the recognition of inflammatory changes in the vitreous under the name pseudoglioma, has given impetus to the diagnosis of retinal tumors. Pseudotumors of the orbit have also been frequently considered, with the view of discriminating between them and tumors in the restricted sense. The choroid, iris, and ciliary body also furnish a considerable class of lesions that more or less closely simulate the true tumors. To think of them as pseudotumors is likely to fix attention on those peculiarities of appearance, progress, and history that may reveal their difference from tumors in the restricted sense—the neoplasms.

THE IRIS.

Most lesions of the iris are so open to inspection, that error or uncertainty

with regard to their nature can be set at rest by repeated careful examinations, extended over a sufficient length of time. I have seen a few thickenings and pigment spots of the iris that had been regarded with suspicion by others; but which I thought nonprogressive and devoid of danger. I have also seen one case of long noticed pigmented thickening of the iris, which I regarded as probably a slow growing sarcoma, while others thought it not of that character, on account of its long duration.

In 1893 I saw with Dr. M. W. Zimmerman of Philadelphia, a patient who presented in each pupil a darkly pigmented mass, apparently projecting from the back of the iris; which he thought, and I agreed with him, was probably a melanotic sarcoma. The late Dr. George C. Harlan was also consulted. He pointed out that the smoothness of the iris in front of these pigmented masses seemed to indicate that the attachment was not to the iris, but probably to the anterior portion of the ciliary body; and that the outline of the mass in the pupil was rather that of a cyst.

If this condition had affected but one eye the patient would have been urged to have it enucleated at once, altho vision was good. But this could not be advised for both eyes. Dr. Zimmerman kept the case under observation, and studied it for four years. He then reported it¹ as a case of probable

cysts arising from the ciliary body. The masses had not changed much, but remained a good deal as when first seen.

In a case reported by Stephenson² a similar appearance was observed in the pupil, and the diagnosis of melanosarcoma made and the eye enucleated. After enucleation, with transillumination of the globe "the pigmented mass appeared as a solid projection jutting into the illuminated pupil." Microscopic examination revealed one large and several smaller cysts, formed by separation of the layers of the iris.

THE CILIARY BODY.

The ciliary body, hidden from ordinary inspection and normally opaque to transillumination, rarely gives direct external evidence of disease. But gumma of this region occasionally gives rise to an appearance of tumor. Another rare and very instructive condition is reported in this journal for May, p. 372, by Dr. Harrington.³ The tumor at the limbus, a common location for dermoids, presented the usual appearances and history of a dermoid tumor. But when the attempt was made to remove it, its real nature was found to be a coloboma of the sclera, with hernia of uveal tissue.

When, by pressing in the ciliary region for the ophthalmoscopic examination, after the method of Trantas⁴, this part is brought into view, the same appearances might be presented as are seen in other parts of the fundus in ordinary ophthalmoscopy.

CASE 1. L. L., a boy aged 13, who had puzzled three colleagues in San Francisco, was brought with vision in the right eye reduced to moving objects. The pupil dilated to 7 mm., but showed numerous posterior synechiae. There were some streaks of opacity and general haze in the vitreous; but not enough to prevent seeing rather fine details of the fundus. The cornea and lens were clear.

At the extreme periphery of the fundus, as ordinarily seen, began a grayish white swelling, sharply demarcated from the adjoining normal choroid, and extending forward to the cil-

iary processes. The retinal vessels passed in front of it, becoming 3 D. more hyperopic upon it, changing from 10 to 13 D. No folds or fluctuation were seen in the retina.

The left eye was normal V. = 1.2. Both eyes transilluminated fairly, and equally. The appearances might well have been those of sarcoma. But a history of some redness and soreness of the eyeball at the start, ceasing after removal of his tonsils, with the synechiae revealed in the dilated pupil, and the fair transillumination, were taken as pointing rather to uveitis.

A year later corrected V. = 0.3, the grayish white mass had become white, and shrunken, with choroidal atrophy; and slight pigment deposits.

THE CHOROID.

Eyes have been removed for sarcoma of the choroid, when they contained no sarcoma. In some cases there seems to have been little evidence to support the suspicion; but in others the most thoro expert examination left great uncertainty as to whether or not a neoplasm were present. The following case presented puzzling appearances.

CASE 2. O. L. R., a man aged 59, was seen 1913, Oct. 15. Vision in the right eye had been failing for about six months. He was unable to read with it for three months. The dimness first was noticed a little below and to the left of the point looked at, but soon included the fixation point. It grew worse gradually. He had been given potassium iodid, but his sight continued to grow worse. He had a doubtful Wassermann, probably negative.

EXAMINATION.—Vision R. 1/15; L. 1. Hyperopia 2 centrad. Otherwise his eyes externally were normal. In the right, in the region of the macula, a circular area twice the diameter of the disc, was lighter and grayer than the general fundus. This was bounded by a narrow light border, better seen when the light was thrown on it at certain angles—a reflex. This area was 3 D. more prominent than the surrounding fundus, its edge rising abruptly. Its surface was almost uniform in appear-

ance. Some of the retinal vessels showed a slight break at the margin of the area. This area was not blind, a 2.5 mm. white object was seen in every part of the corresponding field against a black ground at 50 cm. The physiologic blind spot was not enlarged.

The accompanying sketch (see color plate facing p. 397) was made chiefly

tinguishable. Vision R. = 0.2. The patient thought the sight was "slowly creeping back."

April 15. Corrected vision R. 0.6 some metamorphopsia—a horizontal line looks wavy. The macular area is now at the level of the surrounding fundus. Rather large yellowish dots form somewhat of a wreath in the affected area, near its margin, with some

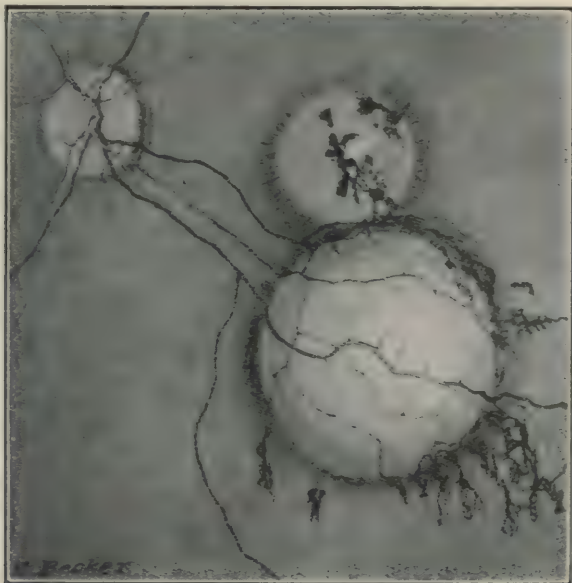


Fig. 1.—Inflammatory exudate, simulating sarcoma of choroid. (Randolph's case.)

to fix the boundaries of the area, with reference to the smaller branches of the retinal vessels. Potassium iodid was ordered to the limit of tolerance.

Nov. 22. The area above described had not increased. Possibly it had extended a little downward. Probably it had contracted a little above. The most prominent point, toward the temporal margin, was only 1.5 D. in advance of the neighboring fundus, and the margin of the area was no longer abrupt. Vision still R. = 1/15.

1914. Jan. 21. The K. I. had been increased to 26 grams three times a day causing rhinorrhea. It was stopped and decreased to 10 grains at a dose. The color of the area was now the same as that of the surrounding fundus, the margin was no longer dis-

massing of them at the upper part. The foveal region was rather gray. There was one pigment blotch about $\frac{1}{3}$ disc diameter across, toward the nasal edge of the area. The retinal vessels looked normal.

The left eye remained normal throughout, with corrected V. = 1.2.

This patient has not been seen since. At the end of six years from the time he was last seen he writes he has had good health but that he has found the sight worse within the last year, so that he "cannot read anything but headlines with it."

OTHER CASES.

One of the most striking recorded cases of this kind is that shown by the late R. L. Randolph⁵ at the meeting of

the American Ophthalmological Society in 1910, and represented in Fig. 1, reproduced from the Society's Transactions. This was the case of a man aged 28, who had been losing the sight of his left eye for over a year. Dr. Randolph was inclined to think the mass an inflammatory exudate. No one who saw the case offered more than a possible diagnosis. Scleral tumor, gumma, and tuberculoma were suggested, beside sarcoma.

Three years later, Dr. Randolph reported⁶ that in spite of negative Wassermann and tuberculin reactions, potassium iodid 100 grains three times daily for 7 months, and tuberculin twice a week for three months had been tried; but without effect. Lately the lower nasal aspect of the mass had been getting irregular, as tho undergoing absorption.

Hird's case⁷ must have presented appearances closely resembling the above Case 2. No picture is given but the description of the clinical appearances is as follows: "The macular region was occupied by an almost circular pale yellowish white area which was raised above the general level of the fundus, the swelling measuring just four diopters in the center. The edges of this swelling were sharply defined, and there appeared to be no change in the choroid and retina around it. Springing from the upper and outer part was a prolongation, like a tail, which ran upwards and outwards, widening and losing its definition until it was lost in normal fundus at the periphery. There was some pigment at the lower and outer part of the swelling, and also some pigment at the root of the tail and along it. There were three hemorrhages in the retina, two between the swelling and the optic disc, and one at the superior border of the tail just where it joined the main mass. There were some fine pigment dots in the retina scattered about the fundus below the swelling. Branches of the retinal vessels—both arteries and veins—ran over the surface of the swelling. There was no detachment of the retina anywhere to be seen, and

the peripheral field of vision was normal."

This case was shown at the Midland Ophthalmological Society, but no one ventured to make a positive diagnosis. Both doctor and patient preferred to have the eye removed. The showing of the microscopic examination is referred to below.

In Ormond's case⁸ "on examination of the left eye a large solid detachment of the retina was seen situated below and on the outer side of the optic disc. The inferior temporal vessels passed over it. The detachment was circular and dome shaped, with a white soft looking surface, edged by numerous small hemorrhages. The top of the swelling was seen with a +7 D. Sph." In spite of the negative report from a medical examination, tuberculin injections gave a reaction, and three months' tuberculin treatment noticeably reduced the size of the tumor.

Wray reported⁹ a case in which the ophthalmoscope showed "the posterior part of the globe is occupied by a large spherical neoplasm probably at least five or six times the diameter of the disc. Its anterior surface is seen with a +18. sph. The retinal vessels course over its anterior surface and run evenly with little distortion, whilst the retina itself is fairly translucent, and in places there can be seen thru its texture what appears to be larger vessels, roughly about twice the diameter of the retinal vessels." Because of its translucency this was supposed to be a cyst. But in discussion Harman instanced a case of translucent detachment, caused by a sarcoma arising from the optic nerve entrance and quite out of reach of transillumination.

In the case of Paton and Collins¹⁰, the large translucent detachment of the retina was assumed to be due to angioma, because there was a large nevus at the margin of the orbit. This diagnosis was confirmed after enucleation.

In Friedenwald's Case 1¹¹, the ophthalmoscope showed in the right eye "in the upper nasal quadrant, reaching to a point near the upper inner margin of the disc, a large, bluish gray,

rounded, elevated mass, the highest part of which could be seen with +12 D. The projection of the growth was, therefore, about 10 D. into the vitreous, indicating a thickness of a little more than 3 mm. The extent of the growth was about six or eight times that of the optic disc."

Numerous other cases have been reported in the literature in which the question of choroidal tumor had to be seriously considered, but was negatived by the subsequent course of the case or the microscopic examination of the enucleated eye.

NATURE OF PSEUDOTUMORS.

Enough such eyes have been removed to furnish a list of pathologic conditions found that is rather a long one. In my Case 2, and also in Randolph's, the tumor was probably a choroidal or retrochoroidal inflammatory exudate. Ormond's case was probably tubercular. In Wray's patient, the lesion appeared to be a cyst, altho no evidence of its parasitic origin was discovered.

Hird found in the eye he removed a retinal mass 5 mm. in diameter and 1 mm. thick; which a committee composed of Collins, Parsons, and Mayou considered was a form of retinal disease with massive, exudation, as described by Coats¹². Friedenwald's second case was of the same character. His first case proved to be one of granuloma of the choroid possibly tuberculous.

On a diagnosis of sarcoma of the choroid Knapp¹³ excised an eye; and found on microscopic examination a subretinal exudate of organized connective tissue, embedding the retinal pigment epithelium. The choroid showed no inflammatory infiltration; and its vessels and those of the retina were normal. Batten¹⁴ reported a case of symmetric swellings in the macular region of each eye apparently due to subretinal hemorrhage. Clarke and Bickerton¹⁵ recorded one in which the

doubtful "new growth in the choroid," in a man of 80, followed repeated hemorrhages.

PRACTICAL CONCLUSIONS.

These cases have been brought together to enforce certain points applicable in the practice of every ophthalmologist.

Pseudotumors of the uveal tract occur, which on first examination present every appearance of true tumors—malignant neoplasms.

These masses vary widely in character and causation. After careful and prolonged tests for syphilis and tuberculosis, the widest range of investigation may throw little light on the origin or the essential character of the lesion.

Malignancy of such lesions can usually be excluded, by watching them over a period of several months or even years. Atrophy of adjoining parts of the choroid, or pigment deposits such as accompany choroidal atrophy, oppose the idea that the lesion is really a neoplasm. Very careful drawings should be made when the case is first seen; and the appearances found subsequently compared with them, to determine if the tumor is extending.

So long as the mass does not increase, watchful waiting is justified, if the eye still retains vision. If the tumor is malignant early removal is of course to be recommended. But for a choroidal sarcoma in the first stage the risk from a few weeks' delay until it shows unmistakable progress is problematic, and scarcely to be weighed against the loss of a useful eye on a doubtful diagnosis. If the affected eye is already hopelessly blind, that is another matter. Such an eye should be removed on the mere suspicion of malignancy. But for a seeing eye, true conservatism requires careful observation; with full records of the conditions present and delay until time makes a more positive diagnosis possible.

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HYPERPLASTIC SUBCONJUNCTIVITIS.

H. McI. MORTON, M.S., M.D., F.A.C.S.,

MINNEAPOLIS, MINN.

This paper reports a new case with abstract of three previously reported of tumor masses which its author thinks should be recognized as a distinct clinical type. With illustrations of the appearance of the eye when first seen and microscopic details of the hyperplastic tissue.

In the issue of the *Journal of the American Medical Association* of December 4, 1897, I reported under the above title, three cases, presenting features that seemed to entitle them to be considered as representing an ocular disease of a distinct type, and worthy of recognition as a distinct clinical entity. That the condition is rare is evidenced by the fact, that, since these cases were reported, twenty-three years have elapsed before I have seen another; and also by the observation, that, in literature, there is to be found practically, or almost absolutely, nothing referring to a like clinical picture, if one excepts the brief mention of this condition by Berry of Edinburgh in his most excellent textbook published about twenty-five years ago, and accompanied by a very good colored illustration.

The syndrome that presents itself is, in the main, about as follows: A more or less extensive hardened, or very firm, tissue mass (see Fig. 1), involving the lower palpebral conjunctiva. In no case has the upper portion of the culdesac been extensively involved. This mass is covered with a thickened conjunctiva, which may show vascular injection, but

is otherwise free from acute inflammation. The size of the elevation may be comparatively small, involving but a third, or less, of the palpebral conjunctiva. It may be a deep and general hyperplasia that leaves none or very little of this membrane after removal of the growth. It may assume a sessile character at its attachment, and bulging out from this, into a large mass; or again it may assume a somewhat pedunculated form, and extend along the whole line of the lower conjunctiva. One case presented a thick plaque like phase; and in this instance,—probably in what may be an atypical one—the plica semilunaris was involved, the disease in this case being more bulbar than palpebral.

Pain has not accompanied the condition, and traumatism has probably been the exciting cause in all of the cases. In two of the cases this was a direct violence from injury, in the others the probable cause being sand or dust. In none of these has there been a history of previous disease of the eye. There was, thruout the culdesac, no evidence of granulation in the affected eyes, nor was there any such in the unaffected eye. After treatment no relapse occurred in

any of the cases, and the established normality left no evidence of the condition.

In one case the hyperplastic growth was 2.5 cm. long, 1.5 cm. broad, 1.5 cm. thick and weight 2 drams; in another case the involvement was less, being about 1.5 cm. by about 2 cm. Where direct trauma has played its part, the rapid onset, and development of the picture, are characteristic and complete.

Berry, after stating that he has seen very few such cases in his experience, suggests that the condition may disappear spontaneously. In none of these cases was this tendency observed, and it is my impression that such resolution would come about in the milder forms of the disease only; and then possibly after an extended period. Before commenting farther I will report the four clinical pictures referred to.

CASE 1. A. V., white, aged 35. The man, a tobacconist by occupation, consulted me July 23, 1894. He had had no previous ocular trouble. Two weeks ago, falling from a bicycle, he was thrown into a bush, a broken stalk of which lacerated the lower conjunctiva of the left eye. Two days after this he noticed a large fleshy mass protruding from the swollen lids. The usual antiphlogistic measures not availing, I saw him two weeks later at my office.

Inspection revealed great infiltration of the upper and lower lids, in both of which existed an external wound, each communicating with a cavity formed by the breaking down of the cellular structure of the subcutaneous tissue of the lids, and from which there was free discharge of pus. These cavities did not communicate with the culdesac. A red tumor mass projected from the interpalpebral fissure, springing from the surface of the lower palpebral and bulbar conjunctiva, involving the entire lower culdesac to within 1 mm. of the corneal limbus, and extending from the outer to the inner canthus. It resembled a large granuloma, was firm in consistence and shiny. There existed a marked infiltration of the con-

junctiva in the fornix of the upper lid, and there was much associated chemosis of the upper bulbar conjunctiva. The movements of the globe were almost entirely restricted. The cornea was transparent, iris normal, and the pupil normal in size and in reaction. Media of the eye were clear and fundal findings negative. There was absence of pain.

The patient was admitted to the hospital, where, under anesthesia, pieces of wood and bark were removed from the wound, and the infiltration incised freely in several places from canthus to canthus. It was of a very dense structure, seemingly almost cartilaginous. After two weeks the phlegmonous inflammation of the lids had subsided, but the mass had increased in size. Altho I feared a malignant growth, no other course remained but its enucleation. Under general anesthesia this was dissected out. It was found adherent to the episcleral tissue of the anterior part of the globe; and, extending somewhat beneath, was a firmly adherent projection to the upper palpebral conjunctiva, beginning 5 mm. from and extending to the inner angle. The removal of the tumor left the lower culdesac practically denuded; and, to avoid symblepharon, a Wolfe graft was taken off the left arm. This took excellently, and left a freely movable globe. There remained an almost complete ptosis, for which, on October 5, I performed a Panas operation.

Microscopic examination revealed a mass of granular consistence, which below assumed a dense and elastic character, and terminated in stringy nodules. It weighed two drams, was 2.5 cm. long, 1.5 cm. broad, and 1.5 cm. thick.

Microscopically; sections studied showed the tissue simply hyperplastic. There is no tumor proper, only infiltration of the normal tissue with round cells. The patient recovered rapidly and there has been no return thruout these many years.

CASE 2. S. R., white, no history of ocular trouble until three months ago. At this time, his father informs me, his

eyes were inflamed, but had not caused him great inconvenience. Two weeks ago there was noticed a growth projecting from between the lids. This now extends from canthus to canthus and is as large as my little finger.

Its attachment was along a narrow line, situated on the conjunctiva of the lower lid, about 2 mm. from the lid margin. A cross section of this growth much resembled that of a railroad rail. The hyperplastic mass was removed,

same as the normal eye. I did not see this case subsequently.

After a long interval, during which neither in my office nor at my clinic, was there a case of this disease, one has recently presented itself. This is an exceedingly typical case, both as regards the history and the clinical picture presented.

CASE 4. Mr. O. C., white, aged 42, presented himself at my office April 28, 1919. Two weeks previously, the left

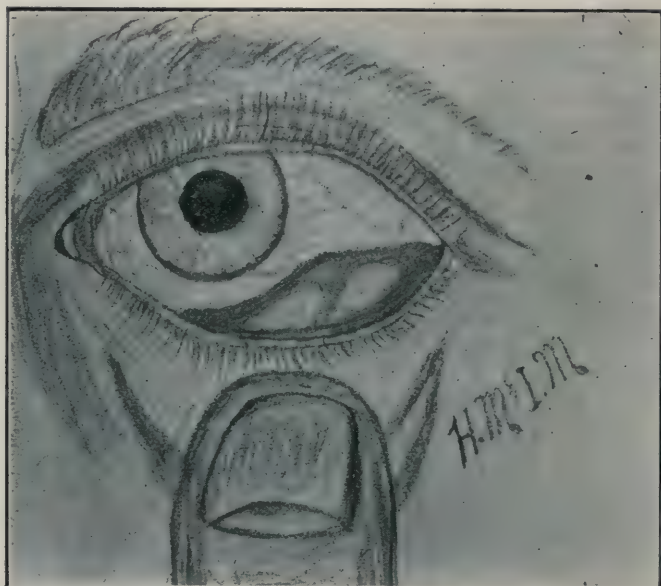


Fig. 1—Tumor-like masses of hyperplastic tissue. (H. McI. Morton.)

after which the edges of the conjunctiva were approximated by silk sutures. Microscopic examination showed simply hyperplasia of the subconjunctival elements.

CASE 3. Miss K. M., white, aged 17, consulted me regarding a disfigurement in the right eye, caused by an immensely hypertrophied plica semilunaris. There was no history of trauma, or of inflammation; otherwise the conjunctiva was normal. The clinical picture presented was that of a large mass involving the plica, and extending to within 1 mm. of the inner corneal limbus, and of a thickness varying from 1.5 to 2.5 mm. She insisted that until one year ago this eye appeared the

eye had become sore, following an injury. He tells me his family physician had removed, at this time, a small foreign body, the exact nature of which he could not state.

The growth occupied a position from the outer limbus corneae to the canthus, under the bulbar conjunctiva, and was reflected over the fornix to the palpebral conjunctiva, almost to the lid margin; and extending over the regions of the accessory lacrimal gland and lacrimal gland proper. It was firm in character, smooth, and attended with very slight, if any, changes in the conjunctival epithelium.

The case was sent to St. Barnabas Hospital, where two linear incisions

were made. These were deep, extending probably to the capsule of Tenon. The case recovered rapidly and by July 1st the eye presented a practically normal appearance.

In reporting his examination of the tissue in this last case, Dr. Kano Ikeda, pathologist of the hospital, states:

"The epithelium shows signs of active hyperplasia, the submucous area shows dense connective tissue cells,

the superficial conjunctiva. The surface of the enlargement is smooth and even, rather than rough and nodular. The process does not extend beyond the subconjunctival tissue and in none of these cases was there involvement of any part of the globe itself or its adnexa. Symptomatically very little is to be elicited, there being no pain or discharge. The accompanying illustrations indicate very well the mani-

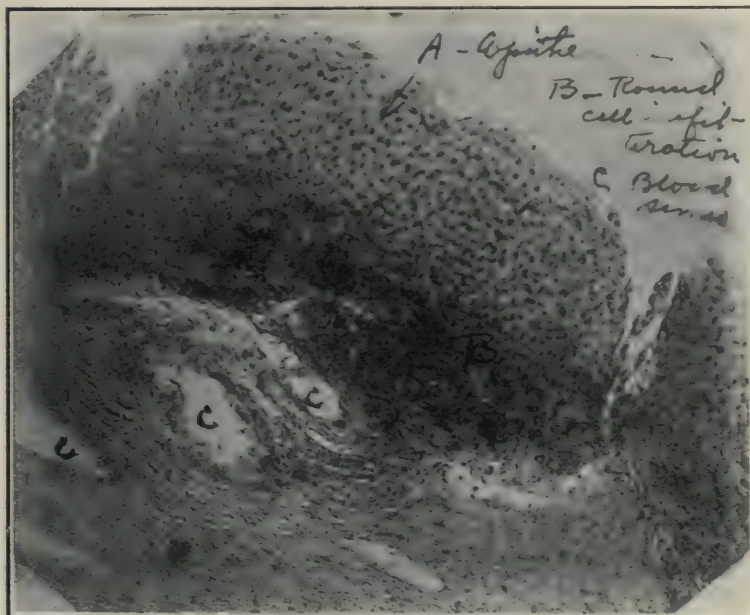


Fig. 2—Section of tissue excised from Case 4. A, hyperplastic conjunctival epithelium. B, round cell infiltration. C, blood sinuses.

numerous blood sinuses and collection of inflammatory cells in subepithelial regions. The general microscopic picture is that of local hyperplasia and hypertrophy due to chronic inflammatory reaction." (See Fig. 2).

Clinically considered, we have then, as represented by these cases, a distinct picture of what is possibly a rather unusual eye affection, characterized by rapid hyperplasia and usually following trauma, the process involving, as a rule, the tissue beneath the inferior half of the culdesac, with comparatively little inflammation of

fest character of the affection, both pathologically and clinically.

The limited experience gained from so brief a series of cases renders opinion regarding treatment of not very great value, though it may be suggested that, deep incision, in the last and recent case, brought about rapid recovery.

In reporting previously upon this condition, I stated and now repeat, that there are probably many unreported cases, which have probably not been recognized as a distinct type of disease of the conjunctiva.

CONGENITAL ATRESIA OF THE LACRIMAL DUCT.

C. S. G. NAGEL, M.D.,

SAN FRANCISCO.

Read before Eye, Ear and Nose Section, San Francisco County Med. Society, April, 1919.

With reports of two illustrative cases this paper discusses the practical aspects of congenital lacrimal obstruction.

The condition made the subject of this paper is not of every day occurrence. Still, aside from being of specific interest to the ophthalmologist, it is of practical moment, from the differential diagnostic viewpoint, to the family physician and the obstetrician. The following two histories are offered as typically representative.

1. A healthy baby girl, first born, 10 days old, referred for purulent discharge from left eye. There is moderate irritation of the eye. No swelling over tear sac. On pressing upon the latter a little mucopurulent fluid comes from the lower lacrimal punctum. Examination of pus smear negative. Strong pressure by finger on sac with slight massage of the region once a day on this and the following day are followed by prompt permanent cure. Diagnosis dacryocystitis.

2. V. G., normal first born, boy of 4 months, seen for the first time February 14, 1918, "has always a tear in his left eye since one week old"—to quote his mother's words. Had been treated with eye drops only. Examination shows moderate conjunctivitis of affected eye, no swelling over tear sac. Pressure on the latter brings quite a liberal amount of purulent discharge from lacrimal puncta, much to the surprise of the parents, the examination heretofore having always consisted in mere inspection of the eye. Diagnosis dacryocystitis.

Pressure and massage on sac and application of zinc drops upon the conjunctiva almost daily for a month only tend to temporarily check the secretion, so that parents consented to a general anesthesia on March 13. Repeated attempts to probe the tear duct thru the upper canaliculus proving abortive, the lower canaliculus was slit, and a No. 3 probe passed thru the whole length of

the duct without any difficulty. There was a little pus on pressure the following day. Since then the eye remained normal, the child having been seen frequently up to the present.

It is now generally accepted that dacryocystitis of the new born is due to atresia of the tear duct. Normally open at birth, the duct may still be closed at its nasal end by a thin septum, a fetal residue. Usually this septum becomes atrophic thru being stretched as the canal widens, finally leading to perforation. According to the anatomic studies of 13 fetuses by Mayou¹, the lower end of the lacrimal canal is very narrow thruout the whole fetal period; and remains so at birth, being partly closed at its nasal end by pressure from the lower concha. It is filled at birth with detritus, which is derived from the solid chord of proliferating epithelial cells which formed the original anatomic substratum of the tear passages, and by degeneration of the central cells of which canalization had taken place.

This detritus is ordinarily soon removed by aspiration. If the lumen be particularly narrow aspiration will remain ineffectual and a secondary infection take place. The lack of an open passage may after a time lead to considerable extension of the sac, which, thanks to the elasticity of infantile tissue, will promptly disappear after a removal of the stoppage. Axenfeld² remarks expressly that in some cases it is only after strong pressure with a glass rod that the contents of the sac can be emptied. This, according to Mayou³ is because the sac fills but part of the fossa lacrimalis in the new born; and may therefore become extended to a considerable degree, before swelling will be noticeable externally; secretion will therefore be gathered for a

considerable time and the trouble be discovered only after weeks.

Other possible contributing etiologic factors are blocking of lumen by circular folds of mucosa (valves of Huschke and Hasner), stenosis thru infraction of bones in forceps delivery, also the curved course of the lacrimal duct in the fetus, as against its straight course in the adult. Rochon-Duvigneaud⁴ found anatomically among 30 heads of all fetal stages incomplete nasal opening of the duct three times; and once this condition was bilateral. It is more rare by far that inflammation of the nose or its sinuses will lead to secondary infection of the sac. Diseased bone conditions of the neighborhood, from tuberculous and gummatous processes, also may bring about similar conditions.

The secretion is generally sterile, at first consisting of epithelial cells, detritus and mucus. Later secondary infection will take place, and there is then no longer any real difference from dacryocystitis of later life, the pneumococcus predominating, and staphylococci also common.

The clinical picture of dacryocystitis neonatorum can simulate ophthalmoblenorrhoea, impressing itself as such on the medical attendants in the first of the histories given above. The only reference I know of, to bilateral occurrence in life is by Seefelder.⁵ There has been described by Peters⁶ and later by Péchin⁷ a persistent form of conjunctivitis in the new born, without any muco-pus from the lacrimal sac. It resists all treatment by instillations, but is promptly cured by pressure upon the sac or otherwise by probing—evidently pointing to closure of the duct as the cause.

It is of practical importance in ophthalmia neonatorum to bear in mind the possibility of secondary infection of the lacrimal passage, if impermeable thru atresia. I, therefore, would advocate an occasional pressure and slight massage of the sac as a routine practice in ophthalmia neonatorum. With a clear passage into the nose the sac does not become infected even in gonorrhoeic or diphtheritic conjunctivitis,

altho inundated with their microbes; hence we must conclude that its mucosa possesses quite different "affinities" or receptors from those of the conjunctiva.⁸ It is more nearly related to the mucous membrane of the nose than to the conjunctiva, may, indeed, be looked upon as a continuation of Schneider's membrane, and the sac thus as a quasiaccessory sinus of the nose—a qualification borne out by its ready involvement in acute rhinitis.

Regarding therapy it would seem best to first try simple pressure, eventually followed by massage; and only in case of not succeeding thus to institute careful probing and perhaps syringing. From some experience in that respect I am inclined to think that in part of the cases at least one would succeed here in probing thru the upper canaliculus (after Otto Becker).

In the light of the almost universally prompt favorable results of our therapeutic measures in congenital affections of the lacrimal sac in the new born, in marked contrast to the situation in later life, one should feel especially reluctant to slit the lower canaliculus for probing.

There may be spontaneous cures, but they are certainly the exceptions, and a case of Bernhardt⁹ shows that the purulent discharge may persist for years if not treated. Expulsion of a pus floccule into the nose immediately preceding cure, has been described in several instances. Groenouw⁹ discusses the probable occasional hereditary nature of the trouble. In the first of the histories given above a child of the father's brother is said to have had the same affection.

Atresia of the lacrimal duct is certainly not so rare as one would have been inclined to think formerly. Bernhardt gives 17 cases from the Rostock clinic in six years, and believes there were probably from 6 to 8 more, where the correct diagnosis was made later, but not recorded. I remember especially, whilst house surgeon with Uhthoff, several cases equally as mild as the first of the two recorded here, which were all cured by simple pressure.

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VISUAL ACUITY AT LOW ILLUMINATION AND THE USE OF THE ILLUMINATION SCALE FOR THE DETECTION OF SMALL ERRORS IN REFRACTION.

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This paper reporting the use of apparatus described in the last number of the JOURNAL brings out some remarkable facts regarding the effect of uncorrected errors of refraction on visual acuity at low illumination and suggests a method of great delicacy for determining the amount and meridians of astigmatism. Presented before the meeting of the American Ophthalmological Society, June 1919.

As was stated in the previous paper (see p. 335) the incentive to this work was a feeling in the Navy of the need to establish a system of testing, for the selection of men for those branches of its service requiring especially keen scotopic acuity. The first step towards the accomplishment of this purpose was of course the devising of a suitable apparatus and test method. A further need, however, was to find out what range of difference in scotopic acuity might be expected among eyes graded as fit on the basis of the tests of other functions and capacities.

We have been interested to make a preliminary survey of eyes graded as normal with regard to photopic acuity and other commonly tested functions in order to determine whether such eyes may be expected to show significant differences in keenness of functioning at low illuminations. This work can, of course, be considered only as preliminary. The final survey and establishment of norms and standards, on which to base the selection, should come thru the testing of a large num-

ber of men in the service of the Navy, or in candidacy for this service.

In a thoro test of ocular fitness for vocations requiring keenness of discrimination at low illuminations, the following points should be taken into account: (1) the minimum amount of light required to discriminate the test object before dark adaptation; (2) the minimum amount after an appropriately selected period of dark adaptation; and (3) the rapidity as well as the amount of gain in acuity during the process of adapting. These points are not only the obvious *a priori* possibilities with regard to individual differences, but they have been confirmed by us in a preliminary survey of a number of normal subjects.

It will be the purpose of this paper to give a brief statement of the results of this survey; also a brief exposition of a new method of using the acuity test in clinic work. That is, in the process of making our acuity tests with a sensitive light control, we have found that the illumination scale can be used with great precision in *detecting small errors in re-*

fraction, and in their correction. This follows rather obviously from the fact that acuity changes slowly with change of illumination, small differences in acuity corresponding, comparatively speaking, to large differences in illumination for all but very low illuminations.

When, therefore, the minimum illumination is determined at which a test object subtending the standard visual angle can just be discriminated, the illumination scale becomes in effect an amplified indicating scale, by means of which the relatively slight differences in acuity, represented by the proper correction of an error in refraction and small deviations therefrom, may be detected with comparative ease and certainty. A useful application of this principle is found, as will be shown later in the paper, in the detection of low astigmatisms and of small errors in the amount and placement of their correction.

RANGE OF ILLUMINATION REQUIRED BY
NORMAL EYES FOR DISCRIMINATION OF
THE STANDARD TEST OBJECT.

In making these determinations three test objects were used: the Snellen chart and two single test objects which could be rotated into different positions,—the letter E and the broken circle—each subtending a 5-minute angle. The determinations were made at the beginning and end of a 45-minute adaptation period. It is obvious from the preceding discussion that the results at low illumination would be influenced by the refracting conditions of the eye as well as by its power of scotopic vision.

In order to make the results represent as far as possible the difference between scotopic and photopic vision, each eye was refracted and the acuity was taken under 5 foot-candles (53.8 meter-candles) of light. In the first series of tests 22 observers were used ranging from 18 to 28 years of age. Results were obtained for both eyes and for the two eyes separately. Of the eyes used, 75.7 per cent were able to read at 6 meters the test type designed to be read at 4 meters; 13.5 per

cent, at 6 meters the test type designed to be read at 5 meters; and 10.8 per cent, the test type designed to be read at 6 meters. It was our intention throughout the work to use only eyes that could be ranked as Grade A with regard to photopic acuity.

The results of these determinations show a greater range of individual difference for the broken circle than for the Snellen chart or the letter E (905 per cent for the broken circle, 548 per cent for the letter E, and 357 per cent for the Snellen chart). This superior showing for the broken circle is perhaps in accord with the general finding, that the broken circle as a test object picks up smaller differences in acuity than either of the other two test objects employed. These differences, too, it will be remembered, are amplified in the present case by the fact that they are read on the illumination scale and not on a scale which sustains a 1 to 1 relation with acuity. Inasmuch as the greater sensitivity was shown in these preliminary experiments by the broken circle as test object, 15 additional observers were employed using this test object alone.

Space will be taken here only for a brief general statement of the results for this latter series of determinations. (1) The individual differences in the minimum illumination required for the discrimination of the test object, before the period of dark adaptation, fell between 0.70 and 5.29 meter-candles, a range of 656 per cent; after the 45-minute period of dark adaptation, between 0.32 and 2.2 meter-candles, a range of 588 per cent. A greater range of individual difference, it will be noted, was found for the tests taken before the period of dark adaptation, than for those taken after the 45-minute adaptation period. This was doubtless in part due to the lack of careful standardization of the initial sensitivity, by a period of preadaptation to light of a fixed intensity; and in part to individual differences in the amount and rate of adaptation. A careful initial standardization of sensitivity was purposely avoided in this preliminary work with

the apparatus, in order more closely to approximate the rough conditions of testing which are apt to prevail in the selection of men with reference to vocational fitness.

(2) Thus far without exception the two eyes of the same observer have required a different amount of light just to discriminate the test object. The minimum difference in this regard for the 15 observers employed, after the 45-minute adaptation period, was 0.12 meter-candle, 19 per cent of the amount required for the better eye; the maximum difference was 1.50 meter-candles, 53.6 per cent of the amount required for the better eye.

(3) A question is often raised with reference to points of advantage of binocular as compared with monocular seeing. In 6 per cent of the cases tested, the binocular result was equal to or approximated the result for the poorer eye; in 88 per cent of the cases, it was better than the results of either eye; and in the remaining 6 per cent of the cases it was intermediate to the results obtained with the two eyes separately. In none of the cases tested was it equal or approximately equal to the result for the better eye. In the 88 per

cent of cases referred to, less light was required for the discrimination of the test object by the two eyes than by the better eye alone by amounts ranging from 14.5 to 67.3 per cent.

In order to get a rough idea of the grouping of the 15 observers with reference to the minimum amount of light required to meet the standard of acuity imposed by the test, before and after the period of dark adaptation, they have in each case been divided into six equally spaced groups; each group for the work before adaptation covering a range of 1 meter-candle, and for the work after adaptation a range of 0.4 meter-candle. For the tests before adaptation, 13.3 per cent fall in the first or best group, 26.7 per cent in the second group, 20 per cent in the third group, 20 per cent in the fourth group, 13.3 per cent in the fifth group, and 6.7 per cent in the sixth group. For the tests after adaptation 6.7 per cent fall in the first group, 20 per cent in the second group, 40 per cent in the third group, 13.3 per cent in the fourth group, none in the fifth group, and 20 per cent in the sixth group. A graphic representation of this grouping is shown in Fig. 1.

TABLE I.

Showing the amount of light required just to discriminate the test object at the beginning of dark adaptation, and at the end of 15, 30, and 45 minutes (15 observers). In these experiments there was no standardization of the initial sensitivity by a previous adaptation to an illumination of constant intensity.

Observer	Photopic Acuity	Illumination in meter-candles required just to discriminate the test object				Difference in illumination required at beginning and at end of 45 min.	
		Beginning	At end of 15 min.	At end of 30 min.	At end of 45 min.	Meter-candles	Per Cent
G	6/4	0.70	0.55	0.35	0.32	0.38	118.8
M	6/4	1.00	1.00	0.82	0.82	0.18	21.9
Mc	6/4	1.24	1.00	1.00	1.00	0.24	24.0
R	6/4	1.36	0.60	0.50	0.60	0.76	126.7
L	6/4	1.55	1.00	0.88	0.88	0.67	76.1
S	6/4	1.75	1.42	0.88	0.88	0.87	98.9
Th	6/4	2.11	0.82	0.94	0.94	1.17	124.5
Y	6/4	2.11	1.55	1.49	1.42	0.69	48.6
St	6/6	2.40	0.60	0.60	0.60	1.80	300.0
Sw	6/4	3.43	2.17	2.20	2.20	1.23	55.9
K	6/4	3.90	2.81	2.40	2.10	1.80	85.7
T	6/4	3.97	1.18	0.82	0.88	3.09	351.1
Sm	6/4	4.10	3.80	1.40	1.30	2.30	215.4
W	6/6	4.20	1.40	0.76	0.76	3.44	452.6
Ba	6/4	5.29	2.11	2.02	2.11	3.18	150.7

INDIVIDUAL VARIATIONS IN THE AMOUNT
AND RATE OF ADAPTATION IN TERMS
OF EFFECT ON ACUITY.

The preceding experiments furnish data with regard to the minimum amounts of light required to just discriminate the different test objects at the beginning and end of the 45-minute adaptation period. In case of the 15 observers tested with the broken circle in the final series of experiments, at the beginning of dark adaptation and at the end of 15, 30 and 45 minutes, the minimum difference in the amount of light was 0.18 meter candle or 22 per cent of the amount required at the end of the adaptation period; the maximum was 3.44 meter-candles or 452.6

affects acuity, which is the effect of greatest importance to the special work for which the apparatus was devised, and the effect with which we are the most concerned for the greater part of our working lives. A comparison of these results with those of similar series, in which the object is to measure the increase in light sensitivity as a result of dark adaptation, shows that just as acuity increases slowly with increase of illumination, so also does it increase slowly with increase of sensitivity to light. That is, the eye does not gain by adaptation nearly so much in acuity as it gains in light sensitivity.

In Fig. 2 the actual amounts of illumination required just to discrimi-

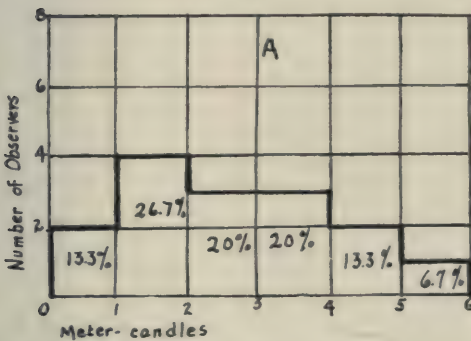
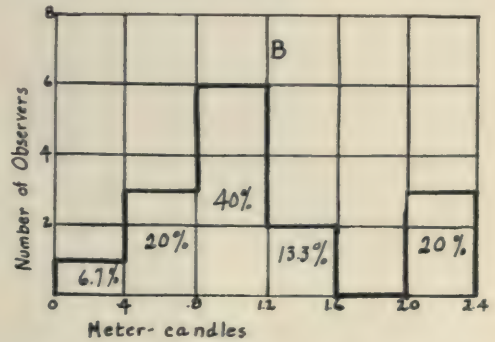


Fig. 1—Representing the relative distribution of 15 observers graded with reference to the minimum illumination required just to discriminate the test object. A, before adaptation; B, after a 45-minute period of dark adaptation.



per cent required at the end of the adaptation period. These results are shown in Table I.

In addition to these experiments a special adaptation series was run, in which the minimum illumination required just to discriminate the test object was determined at the beginning of the adaptation period, and at the end of 5, 10, 15, 25, 35 and 45 minutes. In order to standardize the initial sensitivity of the eyes of the observer, a preadaptation period of 20 minutes was given to 80 foot-candles of light (vertical component), the skylight illumination of an optics room on a medium bright day.

A few of the results obtained are represented in Table II and in Figs. 2 and 3. These results, it will be remembered, represent adaptation only as it

nate the test object are plotted against time of adaptation. It thus affords a comparison of the position of the minima of the different observers in the illumination scale; and comprehends data from which the following points can be determined: (a) their relative ranking with regard to scotopic acuity before and after adaptation, (b) their light sensitivity before and after adaptation insofar as it affects the minimum amounts of light required just to discriminate the test object, and (c) their relative amounts of change in sensitivity, measured in terms of effect on acuity, due to adaptation. All of these features are important for vocational and clinical classification.

In order to make these results more directly comparable with reference to

TABLE II.

Showing the amount of light required just to discriminate the test object at the beginning of dark adaptation and at the end of 5, 10, 15, 25, 35 and 45 minutes (6 observers). In these experiments the initial sensitivity was standardized by 20 minutes preadaptation to 80 foot-candles of light (vertical component), the illumination of a skylight optics room on a medium bright day.

Observer	Photopic Acuity	Illumination in Meter-Candles Required Just to Discriminate the Test Object							Difference in Illumination Required at Beginning and at End of 45 min.	
		Begin- ning	At End of 5 min.	At End of 10 min.	At End of 15 min.	At End of 25 min.	At End of 35 min.	At End of 45 min.	Meter-Candles	Per Cent
I	6/4	0.55	0.505	0.42	0.35	0.32	0.35	0.35	0.20	27.1
II	6/4	0.705	0.42	0.42	0.32	0.32	0.32	0.38	0.325	85.5
III	6/4	1.06	0.76	0.60	0.46	0.35	0.46	0.46	0.60	130.4
V	6/4	1.12	0.82	0.52	0.32	0.32	0.38	0.38	0.74	194.7
V	6/4	1.62	1.12	0.94	0.55	0.60	0.60	0.55	1.07	194.5
VI	6/4	2.20	1.12	1.14	1.18	1.36	1.24	1.24	0.96	77.4

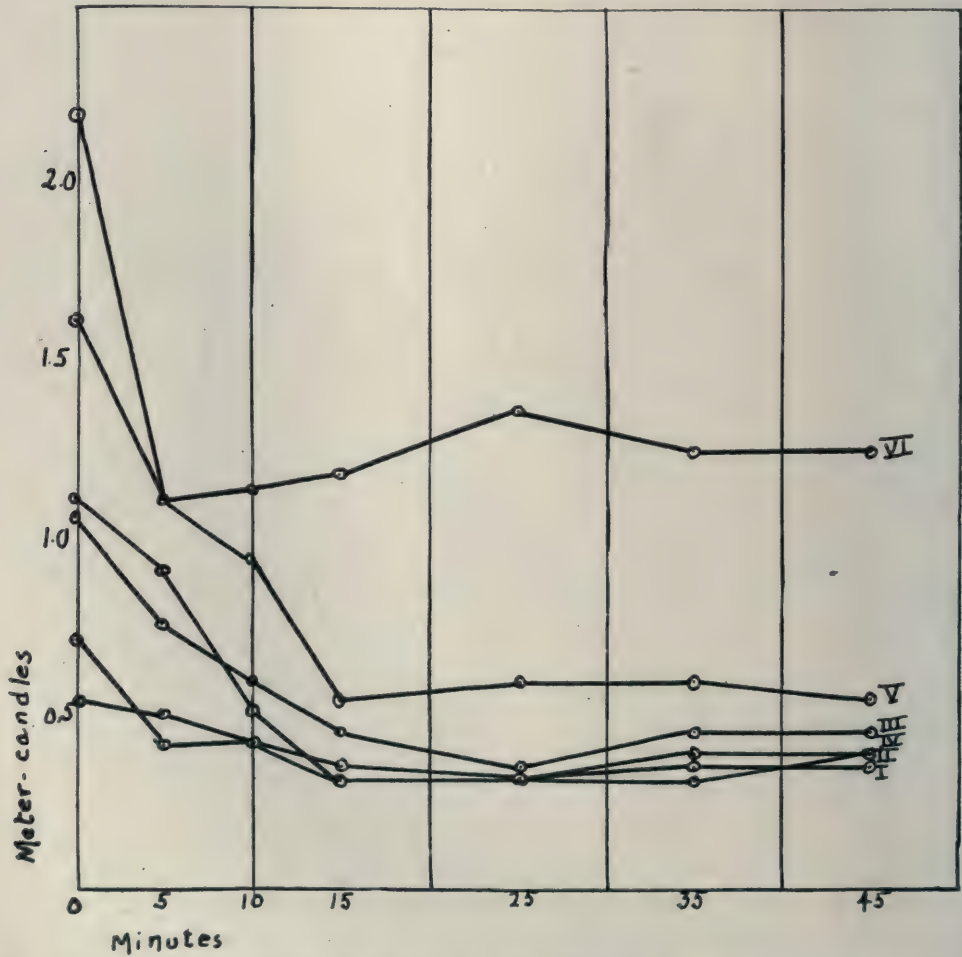


Fig. 2—Curves showing the decrease in the amount of light required just to discriminate the test object as the result of dark adaptation. In order to standardize the initial sensitivity, the eye was preadapted in each case for 20 minutes to 80-foot candles of illumination, vertical component.

the last of these points, namely, the relative amounts of change in sensitivity due to adaptation, the ratios or percentages of increase in sensitivity are plotted in Fig. 3, the reciprocals of the minimum amounts of light required just to discriminate the test ob-

the reciprocals themselves. Space will not be taken here for this representation.

It will be noted that the greater part of these observers reach their maximum acuity at the end of 15 minutes adaptation and that some even show

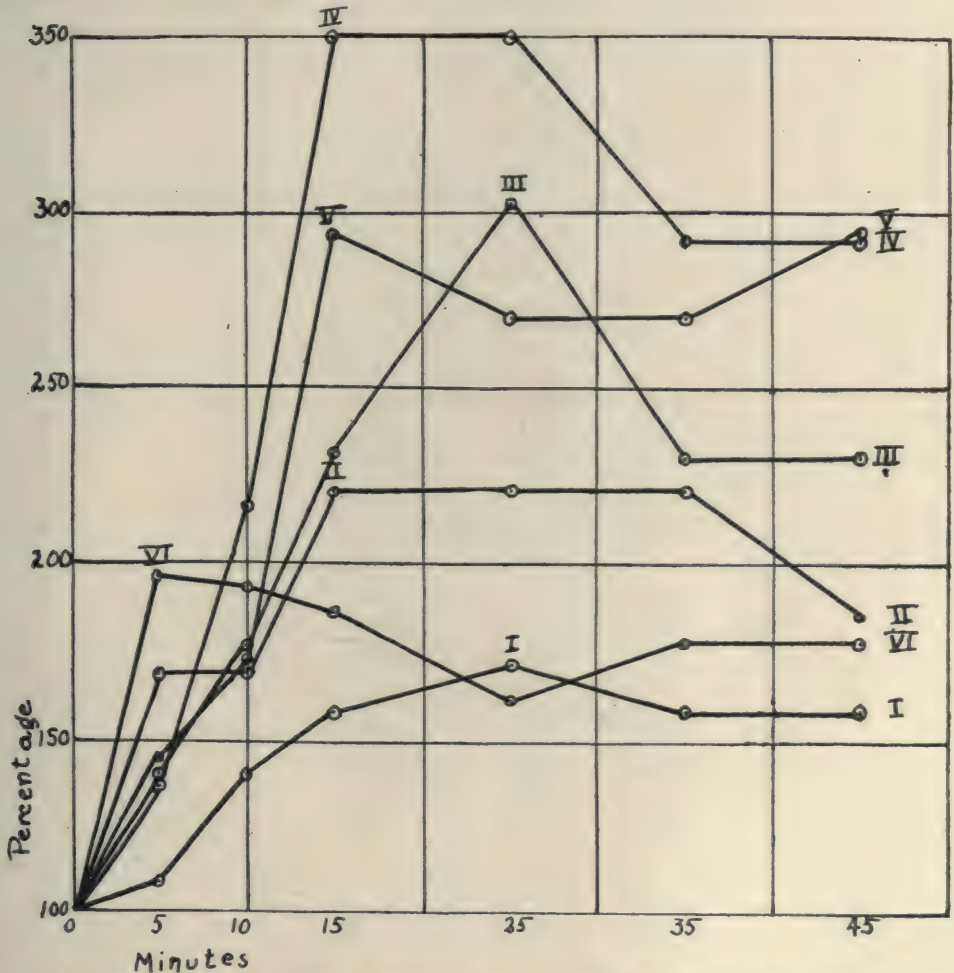


Fig. 3—Curves showing the increase in sensitivity as the result of dark adaptation, the reciprocal of the amount of light required just to discriminate the test object being taken as the measure of sensitivity. Percentage increase in sensitivity is plotted against the time of adaptation. The initial sensitivity of the eye was standardized in each case by 20 minutes of preadaptation to 80-foot candles of light, vertical component.

ject being taken as the measure of sensitivity. That is, the ratio or percentage change in the value of these reciprocals is plotted against time of adaptation, the curves beginning at a common point or unit ratio. The relative rating with regard to the second point could of course be represented by plotting

a lower acuity if the series is continued beyond this time. The loss in their case is doubtless due to fatigue of the muscles of adjustment. That is in case of the observers more susceptible to muscle fatigue, the loss of acuity due to fatigue more than compensates for the small gain in light sen-

sitivity after the first 15-25 minutes. In this connection it may be noted that the strain imposed by taking the acuity at the minimum illumination is much greater than at the illuminations ordinarily used. Even with a 5-10 minute rest period between determinations and a 2 second interval between the individual observations making up one determination, a very noticeable fatigue was present at the end of the 45 minute series.

Sensitivity of the apparatus for detecting small errors in refraction and in their correction.—There are doubtless many ways in which sensitivity can be added to the acuity test for the detection of small errors in refraction and in their correction. In connection with the problems which we have undertaken during the past eight years involving modifications and refinements in functional testing, three principles have come to light which can be used very effectively to this end. That is, the eye which suffers from an insufficient resolving power shows the following functional defects: (1) an undue lag or slowness in making the adjustments needed for clear seeing, (2) a marked loss in power to sustain the adjustments needed for clear seeing, and (3) an increase in the amount of light required just to discriminate details in the standard acuity object.

The devising of test methods based on the first two of these principles has been treated in former papers. The third alone will be considered here. For the purpose of demonstrating its sensitivity as a test principle, low astigmatisms and small errors in the amount and placement of astigmatic corrections have been chosen. Three cases will be considered. (1) Low astigmatisms produced by the use of weak cylinders. In this case the minimum amount of light required to discriminate the test object in the most and least favorable meridians has been determined and at 5, 10 and 45 degrees from the most favorable meridian. (2) Small errors in the amount of the correction. And (3) small errors in the placement of the correction. In these

latter cases, also, in order to know just what the amount and placement of the correction should be, the astigmatism was produced by means of a cylinder of known strength and position, and the amount of illumination required just to discriminate the test object with the true and the false correction was determined.

In choosing to use an artificial astigmatism in this work, it should by no means be understood that we believe that results, with regard to the difference between the minimum amounts of light required for the true and false correction, would be obtained quantitatively identical with those which would be gotten with a natural astigmatism. We are too strongly impressed with the possibility that the astigmatic eye may progressively acquire power to compensate in part for its defect to be of this opinion. The artificial astigmatism was used solely that we might have an exact knowledge of the amount and location of the defect as a check on the determination made by the test. To have knowledge of a natural astigmatism adequate for this purpose would presuppose the supplementary use of a test of equal or greater precision than the one here proposed. We have not as yet been able to develop this precision with the tests already in use.

Sensitivity of apparatus for locating meridian of astigmatism.—It is obvious that if the eye has equal resolving power in all meridians the amount of light required to just discriminate the test object will be the same in all meridians; if the resolving power is not equal, the amount of light required will be different in the different meridians. In Table III it will be noted that in case of an astigmatism produced by a 0.25 diopter cylinder an average result for 5 eyes shows that 107.2 per cent more light was required for the discrimination of the test object in the worst than in the best meridian; at 5 degrees from the best meridian, 50.0 per cent more light was required; at 10 degrees, 95.5 per cent; and at 45 degrees, 107.2 per cent.

TABLE III.

Sensitivity of Apparatus for Locating Meridian of Astigmatism. Astigmatisms produced by 0.25 and 0.75 Diopter Cylinders.

Ob- server	Value of cylinder producing astigmatism	Minimum illumination required for dis- crimination of test object (meter candles)					Difference in result between best and other meridians							
		Best meridian	5° from best meridian	10° from best meridian	45° from best meridian	Worst meridian	Meter candles				Percent			
							5°	10°	45°	Worst meridian	5°	10°	45°	Worst meridian
A	0.25	0.60	0.88	1.49	1.62	1.62	0.28	0.89	1.02	1.02	46.7	148.3	170.0	170.0
B	0.25	1.12	1.75	2.405	2.69	2.69	0.63	1.285	1.57	1.57	56.3	114.7	131.5	131.5
C	0.25	0.46	0.60	0.76	0.76	0.76	0.14	0.30	0.30	0.30	30.4	65.2	65.2	65.2
D	0.25	1.42	2.115	2.49	2.49	2.49	0.695	1.07	1.07	1.07	48.9	75.4	75.4	75.4
E	0.25	1.12	1.88	1.95	2.17	2.17	0.76	0.83	1.05	1.05	69.9	74.1	93.8	93.8
Average							0.501	0.875	1.002	1.002	50.4	95.5	107.2	107.2
A	0.75	1.30	2.69	3.05	3.05	3.05	1.39	1.75	1.75	1.75	106.9	134.6	134.6	134.6
B	0.75	1.81	4.11	4.39	4.39	4.39	2.30	2.58	2.58	2.58	127.8	142.5	142.5	142.5
C	0.75	0.60	1.75	1.95	2.32	2.32	1.15	1.35	1.72	1.72	191.7	225.0	286.7	286.7
D	0.75	3.05	6.895	6.985	7.60	7.60	3.845	3.845	4.55	4.55	126.1	126.1	149.2	149.2
Average							2.171	2.38	2.65	2.65	138.1	157.1	178.3	178.3

In case of an astigmatism produced by a 0.75 diopter cylinder, 178.3 per cent more light was required in the worst than in the best meridian; at 5 degrees from the best meridian, 138.1 per cent; at 10 degrees, 157.1 per cent; and at 45 degrees, 178.3 per cent.

Doubtless the apparatus can be used in different ways depending upon the experience and preference of the operator. For example, the minimum amount of light required to discriminate the test object could be determined for one meridian and the setting of the light control be held constant while the test object is rotated into different meridians, the observer being

required to judge in each case whether more or less light would be required for its discrimination. This would serve as a rough indication whether or not the eye is astigmatic. The exact meridian of the defect could then be worked down thru a series of settings of the test card and light control. A more feasible method, at least in the more apparent cases, doubtless would be first to determine the region of the defect by means of other tests and use the present apparatus only for the more precise location of the meridian. A feasible method is also to use an astigmatic chart of the radial line or sunburst type, the lines of which are no

TABLE IV.

Sensitivity of Apparatus for Detecting Small Errors in the Placement of the Correction of an Astigmatism.

Observer	Value of cylinder producing astigmatism	Minimum Illumination Required for Discrimination of Test Object			Difference in Result for Correct and Incorrect Placements					
		Exact placement of correction	5° displacement	10° displacement	Scale Divisions		Meter Candles		Per Cent	
					5°	10°	5°	10°	5°	10°
A	0.25	0.60	1.33	1.62	13	17	0.73	1.02	121.7	170.0
B	0.25	1.12	2.25	2.69	17.5	22	1.13	1.57	100.9	140.2
C	0.25	0.46	0.60	0.65	3	4	0.14	0.19	30.4	41.3
D	0.25	1.42	1.55	1.88	2	7	0.13	0.46	9.2	32.4
E	0.25	1.12	1.91	2.17	12.5	20	0.79	1.05	70.5	93.8
Average					9.6	14	0.58	0.86	66.5	95.5
A	0.75	1.30	2.49	3.05	17	22	1.19	1.75	91.5	134.6
B	0.75	1.81	3.43	4.39	17	22	1.62	2.58	89.5	142.5
C	0.75	0.60	1.42	2.12	14	24	0.82	1.52	136.7	253.3
D	0.75	3.05	6.44	6.44	20	20	3.39	3.39	111.1	111.1
Average					17	22.0	1.75	2.31	107.2	160.4

more than 5 degrees apart. In this case the procedure would be to reduce the illumination until only one or perhaps two of the lines stand out clearly. This would give a precision, roughly speaking, of about 5 degrees. A more precise result could probably be obtained by featuring three or more of these lines on a rotating dial and turning the dial into the position which gave the sharpest difference between the single line and its neighboring lines.

Sensitivity of the apparatus for detecting small errors in the placement of the correction of astigmatism. In Table IV it will be noted that in case of an astigmatism produced by a 0.25 diopter cylinder, a displacement of the correction 5 degrees from the true position required as an average result for the 5 eyes 66.5 per cent more light than the true placement; and a displacement of 10 degrees, 95.5 per cent more light than the true placement.

ment of the correction of the 0.25 diopter astigmatism, this difference averaged 9.5 for the 5 eyes. That is, since the apparatus can be readily set to half divisions, 19 settings of the light control could have been made with precision between the values needed for the true correction and the 5 degree displacement. This shows that the sensitivity of the apparatus far exceeds the present possibilities of the precise manipulation of the correcting cylinders.

Sensitivity of the apparatus for detecting errors in the amount of correction of an astigmatism. It is obvious that if the astigmatism is fully corrected the same amount of light will be required for the discrimination of the test object in all meridians; if not, an unequal amount will be required in the different meridians.

An average result for the 5 eyes shows (Table V) that in case of an error of 0.12 diopter in the correction,

TABLE V.

Sensitivity of Apparatus for Detecting Errors in the Amount of Correction of an Astigmatism.

Observer	Minimum Illumination Required for Discrimination of Test Object With Different Errors in Amount of Correction						Difference in Minimum Illumination Required to Discriminate Test Object in Most and Least Favorable Meridians					
	0.12 Diopter		0.25 diopter		0.75 diopter		0.12 diopter		0.25 diopter		0.75 diopter	
	Best meridian	Worst meridian	Best meridian	Worst meridian	Best meridian	Worst meridian	Meter Candles	Per Cent	Meter Candles	Per Cent	Meter Candles	Per Cent
A	0.60	0.88	0.60	1.62	1.30	3.05	0.28	46.7	1.02	170.0	1.75	134.6
B	1.12	2.17	1.12	2.69	1.81	4.39	1.05	93.8	1.57	140.2	2.58	142.5
C	0.46	0.65	0.46	0.76	0.60	2.32	0.19	41.3	0.30	65.2	1.72	286.7
D	1.42	1.75	1.42	2.49	3.05	7.60	0.33	23.3	1.07	75.4	4.55	149.2
E	1.12	1.88	1.12	2.17	....	....	0.76	67.9	1.05	93.8	.....	.....
Average							0.52	54.6	1.00	108.9	2.65	178.25

In case of an astigmatism produced by a 0.75 diopter cylinder, a displacement of 5 degrees required 107.2 per cent more light than the true placement; and a displacement of 10 degrees, 160.4 more light. The large number of scale divisions between the correct and incorrect placement of the cylinder will be noted also in this table. In case of the 5 degree displace-

54.6 per cent more light was required in the worst than in the best meridian; in case of a 0.25 diopter error, 108.9 per cent more light was required in the worst meridian; and in case of a 0.75 diopter error, 178.25 per cent more light was required. In addition to the points already noted, the above results in connection with those of the preceding experi-

ments emphasize the especial need of good resolving power for all work at low illuminations. A small error in refraction or in the amount and placement of its correction is a much more serious handicap at low than at full illumination. A correction, for example, which is adequate for all practical purposes at full illumination would in many cases raise the lower limit of clear vision to such a degree as seri-

ously to disqualify the subject for work at low illuminations. It seems fair to infer too from these results that the individual differences in the amount of light required as a comfortable working minimum, frequently encountered by the illumination specialist, are due to differences in resolving power as well as to differences in retinal capacity.

A STEREOMICROMETER.

CAPTAIN HARVEY J. HOWARD, M.C.,

PEKIN, CHINA.

This is an instrument of precision for measuring stereopsis, or the power of judging differences in distance or depth at the ordinary reading distance. It was worked out at the Medical Research Laboratory, Mineola, N. Y. Authority to publish granted by the Surgeon General's Office. Presented at the American Ophthalmological Society, June, 1919.

Stereoscopic pictures of figures, viewed thru a stereoscope, produce an illusion of solidity or depth, which simulates one of our most common visual experiences, viz., true depth perception. The effect produced is merely an illusion, because in reality the two pictures are in the same reference plane, i. e., there is no difference in distance. The phenomena of depth and depth difference are produced by employing the principle of the binocular parallax. Objects are made to appear relatively nearer or farther away from the observer simply by varying the lateral separation between identical objects or points in the two pictures.

While working upon the subject of judgment of distance with an apparatus employed at a distance of six meters (See A. J. O., v. 2, p. 656), one of my co-workers, Captain Percy W. Cobb, suggested that I adopt the same form of test objects in a hand stereoscopic instrument of precision, for the purpose of producing any degree of depth illusion desired. In the six meter apparatus two black rods with a light surface background were viewed thru the window of a box, the purpose being to learn the smallest depth dif-

ference discernible by different individuals. The binocular parallax was found to be the essential factor in the resultant determinations. The respective depth judgment ability of individuals was reckoned according to their minimal binocular parallactic angles, which were computed from interpupillary distances and depth difference thresholds.

In the hand stereoscopic instrument suggested there would be two pairs of vertical lines or objects to be fused. To produce a sense of depth, the only other essential would be to effect a different lateral separation between the pairs of fused objects, i. e., the binocular parallax would be applied directly and not indirectly as is the case with the nonfused objects of the six meter apparatus.

In addition to Captain Cobb, I am indebted to Mr. Max Poser of the Bausch and Lomb Optical Company for valuable suggestions in formulating the final plans for the instrument.*

* Authority to make according to specifications granted February, 1919 to the Bausch and Lomb Optical Company by the Supply Department, Hazelhurst Field, Mineola, Long Island, N. Y.

DESCRIPTION OF THE INSTRUMENT.

Figure 1 represents a photograph of the completed instrument. Roughly it is about nine inches high, six inches wide and five inches deep.

Figure 2 shows the hood and the box containing the four test objects which are small wires tightly drawn and

comparable. The lenses (Fig. 3) are as carefully made and adjusted as are those in a pair of field binoculars. Each lens has a focal length of 137.5 mm.

At the right side of the instrument is a micrometer screw which has a lateral movement of exactly 0.5 mm

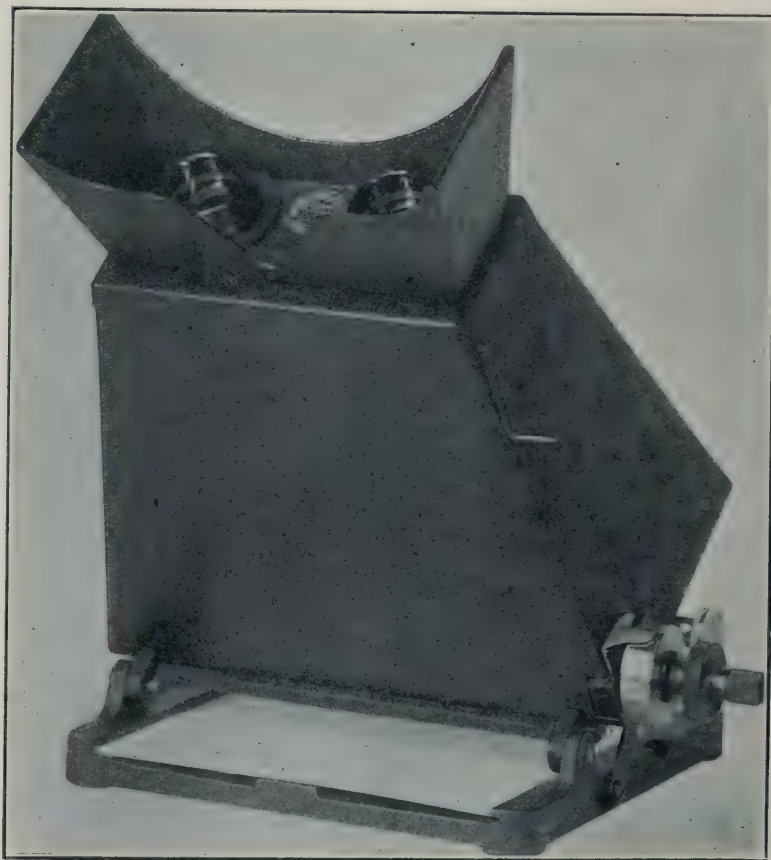


Fig. 1—Howard's Stereomicrometer, complete instrument.

enamelled black. The pair of wires on each side in the completed instrument are 1.375 mm. apart which gives them an angular separation from the center of the lens of exactly one centrad. This angle was decided upon because in experiments with an apparatus at six meters and another at 100 meters, the centrad separation of the test objects had always been used. From this standpoint therefore the results of all three forms of apparatus should be

for each revolution. Attached to the axis of the screw is a drum, with its peripheral surface marked off into 100 equal parts. Each division on this scale represents a lateral shift of the screw of 0.005 mm. Attached to the axis of the screw there is also a double turning knob. Fixed in a horizontal position at right angles to the drum is a metal plate marked off into a 0.5 millimeter scale. Within the box (Figure 6) the micrometer screw

butts firmly against the long end of a lever. With a leverage of five to one, the short end is attached to a bar which holds in position the right hand wire. To take up all slack and lost motion a spring is fixed, one end to the movable bar and the other end to a position inside the instrument. The other three wires are maintained independently of the fourth and in fixed positions. The effect of the "five to one" leverage is to reduce the lateral movement, transmitted thru the micrometer screw to the right hand wire, to one-fifth that of the screw. One division therefore on the micrometer scale represents a lateral movement of that wire of 0.001 mm. or one micron.

Attached to the bottom of the metal stereoscopic box is a base plate of metal upon which the box can be tilted and fixed by a set screw in any position from 90° to 180° . In the upper edge of the base plate is set an opaque milk glass to give an indirect uniform light background for the wires above it.

Behind the lenses is a shutter, which is attached to a wire lever protruding thru the upper right hand side of the box. By manipulating the wire lever the examiner, or the subject himself, is able to produce practically an instantaneous view of the wires, which effect was found to be so valuable in the experiments of the six meter apparatus.

MATHEMATICAL PRINCIPLES INVOLVED IN THE USE OF THE INSTRUMENT.

Let p = interpupillary distance of lenses;

and m = the binocular parallax produced by turning the micrometer screw;

and d = the focal length of the lenses, or the distance to the apparently nearer wire;

and D = the imaginary distance to the apparently farther wire.

Angle 1 — angle 2 = angle 3, the binocular parallax angle.

For any small angle, like angles 1, 2 and 3, the tangent and the angle in radians are practically equal with negligible error.

Then $\tan \text{ angle } 3 = r$ (angle in radians)

But $\tan \text{ angle } 3 = m/d$

then $r = m/d$

or $m = rd$

If for example we let the binocular parallax angle (3) = 1° then 1° in radians = 0.01746 (which is an established mathematical equation). If also $d = 137.5$ mm. the focal length of the lens, then $m = rd = 0.01746 \times 137.5 = 2.4$ mm. If 2.4 mm. therefore represents the binocular parallax when we know the focal distance of the lens to be 137.5 mm. and the binocular parallax angle to be 1° , we can readily tabulate binocular parallax measurements representing any number of binocular parallax angles desired, as

$1^\circ = 2.4$ mm.

$1' = 0.04$ mm.

$1'' = 0.00066$ mm.

$1.5'' = 0.001$ mm.

But it was planned that one division on the stereomicrometer scale would represent a lateral movement of the right hand wire of 0.001 mm. Therefore each division on the scale also represents a binocular parallax angle of $1.5''$.

When the distance to the apparently nearer wire and the binocular parallax from the reading on the scale are known, then the formula $r = m/d$ may be applied directly, e. g., when

$m = 0.001$ mm. then by substitution

$r = .001/137.5 = 0.00000727$

But 0.00000727 radian = $1.5''$.

If again we desire to know the apparent depth difference ($D-d$) represented by any binocular parallax measurement which is read off directly in microns from the micrometer scale the results are computed as follows:

$\tan \text{ angle } 1 = p/d$

$\tan \text{ angle } 2 = m/d$

$\tan \text{ angle } 3 = p/D$

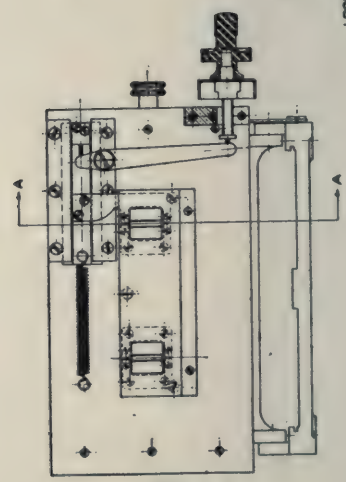
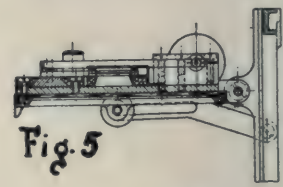
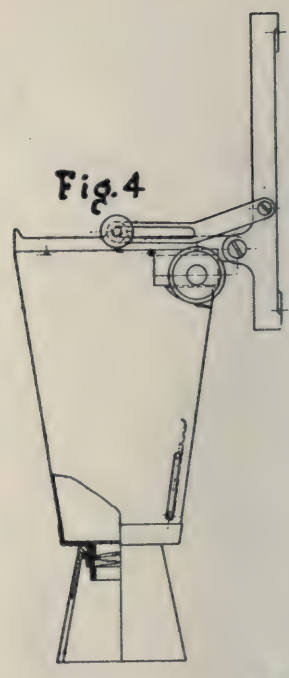
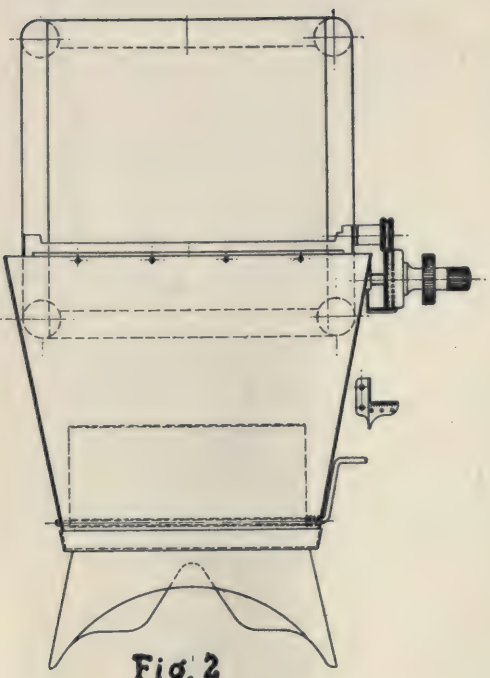
then $p/D = p/d - m/d = p-m/d$

or $D/p = d/p-m$

and $D = pd/p-m$

But $p = 64$ mm. and $d = 137.5$ mm.

If $m = 2.4$ mm. (the parallax of a binocular parallax angle of 1°) then by substitution $D = 64 \times 137.5 / 64 - 2.4 = 142.85$



Diagrams of details of stereomicrometer.

and $D-d = 142.85 - 137.5 = 5.35$ mm.

When $m = 0.04$ mm. (the parallax of a binocular parallax angle of $1'$) then by a similar method of computation $D-d = 0.084$ mm.

When $m = 0.01$ mm. (the parallax of a binocular parallax angle of $15''$) then $D-d = 0.0215$ mm.

When $m = 0.001$ mm. (the parallax of a binocular parallax angle of $1.5''$) then $D-d = 0.00215$ mm.

CONCLUSIONS: The test is made by requiring the subject to set the wires into what he thinks is the same reference plane, i. e., equidistant from his eyes. After a number of such trials the average error represents his binocular parallax angle threshold. This threshold is computed in seconds by adding 50% to the reading on the scale representing his average error. For example, if the scale reading is 10 divisions from the zero mark, then his minimal binocular parallax angle is $15''$. With such an instrument it is possible to classify individuals according to their respective degree of stereopsis. With those who have the ability of fusing stereoscopic objects, e. g., nearly all those having binocular single vision, this classification should represent their respective ability to judge

distance. This instrument should offer a far more satisfactory test of stereoscopic vision than the ordinary hand stereoscope which has been used almost universally in testing candidates for aviation service.

The instrument perhaps offers a more direct application in testing and classifying candidates for the naval and artillery services, where according to recent communications the men may be required to use stereoscopic range finders. During the war it was known that the central powers used stereoscopic range finders almost exclusively. The entente powers on the other hand used various forms of coincidence range finders, but towards the end of the war the U. S. authorized the manufacture in this country of a number of stereoscopic range finders. The comparative results with the two forms of range finders will depend very largely upon the selection of the men using them. By means of the stereomicrometer it should be possible to select only those who possess the highest degree of stereopsis or judgment of distance. This group should show such a remarkable ability with the stereoscopic range finder that its use may eventually be adopted in place of the ordinary coincidence type.

A FIELD INVESTIGATION OF THE ETIOLOGY OF TRACHOMA IN EASTERN KENTUCKY.

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SAN FRANCISCO.

This report of the results of the study of the actual conditions bearings on the etiology of trachoma is published by permission of the Surgeon General of the Public Health Service. It includes a survey of the literature and present status of the subject, reaching the conclusion that the most potent cause of trachoma is interhuman contagion.

Following a report to the Surgeon General of the U. S. Public Health Service in August, 1918, of my investigations in California (and previously in Oregon), which apparently demonstrated the existence of an animal scar-tissue conjunctivitis of insect origin, etiologically related to trachoma, and affording a working hypothesis, in June, 1919, I was reappointed acting assistant surgeon and ordered to continue the same work in eastern Kentucky and other portions of the Appalachian region.

The report of 1918 was substantially incorporated in an article published in the February, 1919, issue of this journal.

Proceeding to Lexington, Ky., early in July, necessary arrangements were made thru Surgeon John McMullen in charge of the trachoma work of the Public Health Service, with the staff of the Agricultural Experiment Station of the University of Kentucky, and I then proceeded first to the U. S. Trachoma Hospital at Jackson, Brethitt county, Ky.

The articles of Dr. J. A. Stucky, Surgeon McMullen, Dr. Park Lewis, and others have rendered familiar the social habits and customs of the Kentucky highlanders, and their sad affliction from trachoma.

The narrative of my experiences among these people will therefore be concise and brief; my main purpose being to draw attention to certain facts which have led me to reverse my former views concerning the existence of an ectogenous source of the trachoma virus; this change of view being largely the result, however, of my work in Kentucky.

Every element and all conditions favorable to the investigation of a possible relation of animals and insects to trachoma, are present in the mountain region of Kentucky: An infected population, the majority of which possesses horses indispensable for transit in a roadless country; and with which men, women and children are in daily contact; dogs in nearly every home; and, in the timber, an abundant fauna of biting tabanidae.

My procedure in Brethitt county, as in other localities, included examining and questioning patients at the trachoma hospitals, citizens, farmers and local veterinarians, and examination of the conjunctivae of horses. In addition I made horseback trips for some distance along the many creeks, interviewing the natives, visiting them in their homes and examining the eyes of their horses, and secured specimens of the four species of tabanidae infesting animals thruout the whole mountain region of Kentucky and Virginia.

These were properly prepared for microscopic examination. Nevertheless, in Brethitt county I found only one case suggestive of equine folliculosis; no scar tissue was found.

There were difficulties. It was not possible to examine horses *ad libitum*; the owners had to be consulted. Here an obstacle was encountered in the fact that the Kentucky mountaineer is, by instinct and training, a born horse dealer who invariably conceals, if possible, any eye affection of his horses, and as invariably seeks by trade to get rid of a seriously affected animal. An element of uncertainty too, was the uniform unreliability of verbal lay evidence. With the exception of one

native who stoutly asserted that with the assistance of an educated physician, he had turned the eyelids of one of his horses and seen palpebral and ocular conjunctiva granulations which the physician declared were identical with those of trachoma, and the statement of two mountaineers who claimed to have turned the lids and seen "granulations" in numbers of horses, I uncovered no evidence that seemed reliable from this source in Brethitt county; nor from veterinarian sources. The evidence, so far, was wholly negative.

After a month of work in Brethitt county, I proceeded to Pikeville, in extreme eastern Kentucky. In Pike, and the adjoining counties, trachoma is very prevalent. Dr. R. W. Raynor, for five years in charge of the U. S. Trachoma Hospital at Pikeville, dissented decidedly from the theory of equine conjunctivitis as a trachoma factor, stating that he had visited the native homes in Pike county extensively and had found the newer cases so grouped about single, old cases, as to convince him that the latter were foci originating the former, and that the disease spreads in the mountains solely by interhuman contagion.

The local veterinary, a highly educated, intelligent graduate with an extensive practice, gave me reliable and valuable information of the animal conditions of the region. He had never seen follicular conjunctivitis in horses, tho as a routine he examined the conjunctiva, and for four years he had vigilantly looked for it, and also for equine trachoma because of the disease among the people. The poorer mountain folk from far up the creeks brought their horses to him as frequently as those near by, but follicular disease was not found. I have no hesitation in stating that equine follicular conjunctivitis does not exist in Pike, and neighboring counties, or is exceedingly rare.

In fact, my findings in Brethitt and Pike counties now appeared to me to be typical of the whole mountain region, and I turned my attention to other etiologic indications, such as the predominant rural prevalence of

trachoma, climate, soil, etc., and above all to the attainment of a broader view of the disease as a world malady, presumably manifesting characteristics varying with its regional distribution. In other words, to its natural history.

As forty per cent of all dogs have conjunctival folliculosis (Fröhner), and entropion and other lid complications are far more frequent among them than horses, in September I proceeded to Lee county, a region once severely infected with trachoma, and still infected. There, on horseback (on two creeks), I visited eighteen homes; and in these homes carefully examined the conjunctivae of twenty-two dogs' eyes. Sixty per cent showed marked hyperemia, with slight swelling of the retro-tarsal folds, amounting in 20 per cent approximately to chronic conjunctivitis of mild grade, and exhibiting the folds beaded sparsely with moderate-sized follicles; secretion mild and mucoid. No scar tissue was found. All these eyes appeared normal externally. During these visits I saw chickens and turkeys walking about in the houses. I also learned that the trachomatous eyes of persons who fall asleep during the day time, especially children, are infested with feeding house-flies.

The conjunctival conditions in dogs were so trivial as to warrant the conclusion that in that region where trachoma has long been endemic, the eyes of dogs bear no relation to it; and in that respect are identical with those of other parts of the state, as observed by myself and veterinarians, and also in California in 1918. In California I have seen severe canine follicular conjunctivitis (without scar tissue) where trachoma is unheard of; where conditions were favorable to contagion to human eyes, yet it did not occur. I now brought my investigation to an abrupt end.

The work, involving as it did an unheard-of but plausible connection between the eye affections of familiar-domestic animals, and an ubiquitous disease that had scourged nearly every home in their midst, so appealed to the imagination of the mountain people,

that it was necessary to repeatedly impress upon them the utter lack of proof of such connection; that animals' eyes could not be excluded with certainty as causes save by examining them; and to warn them to fear their neighbors, not their animals; especially their visitors and over-night guests, who, using their soap, towel and basin, might plant the disease in the family, only to be discovered long after and then attributed to some other and fancied agency.

The investigation was neither extensive, nor, measured by scientific standards of thoroughness, exhaustive. It simply excludes by negative evidence, in a limited area, the agency of animals and insects, at a time when certain infectious diseases have been proved to have such origin, and the plausibility of a like origin for trachoma therefore has been enhanced.

Strictly speaking, the results are true only for the highlands of Kentucky. More extensive research in other regions might establish a relation between insects, animals and trachoma, since it has been stated and quoted by Boldt that there is much eye disease in horses, oxen, sheep and dogs on the Lower Nile.

It is believed, however, that the investigation not only demonstrates a negative condition, but also bears out the statement of Passed Asst. Surgeon J. W. Schereschewsky (now Asst. Surgeon General), of the Public Health Service, in 1907, that, "endemic for a number of years in certain restricted areas of southern Illinois, the mountains of Kentucky and West Virginia, * * * the evidence is all in favor of the supposition that it (trachoma) did not originate in these areas, but was due to importation, and, by reason of the comparative poverty and lack of medical facilities prevailing in these sections, was able to become firmly domiciled there."

It may be added that the conditions in the Kentucky highlands also afford a perfectly typical illustration of Boldt's observation that, "All experts are agreed that the endemic form of trachoma appears chiefly and primarily

as a disease of families," and that, "the family is the main channel for its spread, and to a certain extent the incubator of the virus."

Undoubtedly the well known unsanitary habits and social customs of the mountaineers of Kentucky are by far the most potent, and probably the sole, causes of trachoma both as regards its prevalence and dissemination.

PRESENT STATUS OF TRACHOMA IN SOUTHERN ILLINOIS. In 1901, Dr. W. H. Wilder, thru statistics of the Illinois Eye and Ear Infirmary at Chicago, found that by far the greatest number of trachoma cases at that institution came from the southeastern counties, especially those bordering the Wabash river; and claimed that the disease in Illinois is distinctly a rural one and comparatively infrequent at the centers of population.

Being unable to visit Illinois, by correspondence with oculists in a number of these counties, I have obtained data which collectively clearly indicate that in the past fifteen or twenty years, to quote one writer, "the disease, formerly prevalent thru the insanitary conditions of the homes, and ignorance of the people, * * * has largely disappeared owing to better educated and more cleanly and thrifty people."

Another states, "In Lawrence county the disease is, with us, almost a thing of the past. We once (probably 20 years ago), had many cases here. The country people were the ones most frequently affected. Now, we see many sequelae of the disease; entropion, corneal opacities, etc., * * * but almost entirely among the old people (fifty years, or older). * * * It is the consensus of opinion that the common towel, basin, etc., are the means by which infection is transmitted. Years ago entire families were infected in this way."

Dr. E. E. Edmonson, of Mt. Vernon, Ill., writes: "I have to impeach the towel and wash basin as carriers, * * * the fogs and drizzling rains render the towel a potent carrier of the disease, and the dust of the highways in summer is a possible carrier, or, at

least, an irritant, and thereby fertilizes the field for the reception of the virus."

The testimony of these correspondents is unanimous, and convinces me that in southern Illinois, as in Kentucky, the outstanding causes are the ignorance and insanitary habits of the rural inhabitants, and that climate, soil, etc., are but contributory causes. There appears to be no other cause for the rural prevalence than those here given.

I was now ordered to Washington City with instructions to consult records, data and literature regarding the etiology of trachoma. This work was prosecuted mainly at the Hygienic Laboratory, and the library of the Surgeon General of the Army. A limit of time being fixed for the completion of the reports, the work was confined to seeking data concerning the geographic distribution and manifestations of trachoma as reported in the literature since 1913. It is needless to state that bacteriologists have virtually thrown up their hands in despair of finding the specific microörganism.

A comprehensive definition of the word "etiology" implies that the specific cause of a disease is potent,—a cause only,—when and where the conditions, sources and agencies essential to its existence, reproduction, dissemination, and entrance to the human body, are present; also, that these conditions, sources, etc., are themselves causes, and necessary data for a complete demonstration of the etiology of that disease.

Thus limited, a diligent search of all the literature of trachoma since 1913 was conducted. It is unnecessary to detail the results. The etiologic factors adduced by writers in all parts of the world vary from climate, soil, living habits, etc., to nasal disease, and to this writer appear collectively, provincial, partial and lacking in intelligent discrimination. The old tendency to emphasize the influence of climate as against immigrant and importation, and sanitation, is very evident. In short, nothing was found serving to advance the knowledge of the etiology of trachoma

a single step beyond the point reached by Boldt in his classic work.

In contrast to these barren literary gleanings, stand the contributions of the trachoma experts of the Public Health Service, which the writer has studied with some care. It is in no spirit of sentimental self-disparagement, or as assuming the role of apologist for his ophthalmic colleagues in civil life; or yet to indulge in fulsome commendation, that the writer takes this opportunity to express a sincere appreciation of the breadth of view, restraint of statement and scientific sanity and caution which characterize the reports and literary contributions of the personnel of the Public Health Service. These are, of course, the natural results of the exceptional and world-wide opportunities afforded the officers for observation; and of the organization, discipline and esprit of the service. On the other hand, some civil writers appear to be either subjects of an euphoric enthusiasm with its resulting *mania scribendi*, or possessed of a too limited equipment of knowledge concerning the life and development of microörganisms in animals and man.

No better illustration of the last is afforded than by the writer in seeking to establish an ectogenous source of trachoma.

And for the following reasons: There is not yet the slightest evidence that the trachoma virus has an ectogenous existence. On the contrary, the writer now knows that some bacteriologic pathologists of repute, in regard to the mutation of microörganisms, advance a working hypothesis that specific microörganisms presumably once possessed of an ectogenous existence, after gaining entrance to the human body, and after a long lapse of time, lose their ability to exist outside of it,—i. e., become endogenous. A knowledge of this view alone would, or should have, deterred the writer from hasty generalization, and a premature announcement of his theory.

All the known properties of the trachoma virus, notably its low vitality and inability to withstand drying at 32 degrees C. for one hour, render it highly

improbable that it has any other than an endogenous existence, and as highly probable that its sole habitat is the human conjunctiva. Indeed it is logical to conclude that such a line of investigation as was pursued in the past by the writer in seeking an ectogenous source in Nature, is foredoomed to failure. The known facts controlling the dissemination and prevalence of trachoma point to the same conclusion.

There is some clinical evidence favoring the existence of a conjunctival affection in animals analagous to trachoma, but proof of this is wanting. Even if this were established, its transmissibility to man would remain in question.

CONCLUSIONS.

1. Outside the laboratory, and excepting the causes controlling the dissemination and prevalence of trachoma, no facts were found in medical literature substantially advancing the knowledge of its etiology since 1914.

2. Climate, soil, dust and individual predisposition, are subsidiary and contributory causes of trachoma. Some climates, to an uncertain and limited extent, appear to attenuate the virulence and diminish the contagiousness and transmissibility of the disease.

3. There is no evidence that the trachoma virus has an ectogenous existence. All its known properties, and the conditions attending its dissemination and prevalence, indicate that it is endogenous to the human conjunctiva, and that that is its sole habitat.

4. There is some evidence indicating the existence of a conjunctival affection in animals analagous to trachoma, but it is inconclusive; and if existent, its transmissibility to man is, according to the teaching and precedents of bacteriological pathology, improbable.

5. By far the most potent known cause of trachoma, is interhuman contagion, due to insanitary habits and social customs.

OPHTHALMIC SERVICE OF A DIVISION OF THE BELGIAN ARMY IN THE FIELD.

MARCEL DANIS, M.D.,

BRUSSELS, BELGIUM.

This account of the organization and work of ophthalmologists in the Belgian Army may be compared with those of the American Expeditionary Forces (see vol. 2, pp. 319, 500, 565; v. 3, p. 343). Translated by M. W. Tredrick.

The trench warfare, and its long duration, prompted the Director General of Medical Services to establish services in the specialties, in all the hospitals at the front and at the rear, as well as in the sanitary formations accompanying the army in the field. Every army division has one or more divisional infirmaries, situated, as a rule, in the center of the cantonments, where they occupy barracks specially constructed for their purpose, or the large structures such as schools, theaters, assembly halls, convents, etc.

To these sanitary formations the regimental physicians send the sick and slightly wounded; here also the specialists in oto-rhino-laryngology, syphilology, urology, ophthalmology, stomatology, etc., are consulted. Here, also, treatment is given those who are being treated in the infirmary and those whose condition does not require hospitalization.

The consulting room of the oculist does not shine with the luxury and comfort of a modern installation; a small room with a window and shutter replaces the elegant installations of La Panne and Beveren. The correction of errors of refraction is a large part of the daily work of the divisional oculist and is of capital importance from a practical point of view.

Our outfit always included a large stock of ordinary spectacles with spherical lenses. The correction of astigmatics presented great difficulties, both on account of the great number of possible combinations, as well as on account of the inclination of the axes. Our excellent colleague, Professor Weekers, solved the problem with ease by adopting a frame with round cells, in which the lenses can be turned to any axis desired.

His choice of lenses was the following:

Cylinders: +1, +1.5, +2, +3.
Cylinders: -1, -1.5, -2, -3.
Cylinder +1, with spherical +1, +2, +3.
Cylinder +1.5 with spherical +1, +2, +3.
Cylinder +2 with sph. +1, +2, +3.
Cylinder +3 with sph. +1, +2, +3.
Cylinder -1 with sph. -1, -1.5, -2, -3, -4.
Cylinder -1 with sph. -1, -1.5, -2, -3, -4.
Cylinder -1.5 with sph. -1.5, -2, -3, -4.
Cylinder -2 with sph. -1, -1.5, -2, -3, -4.
Cylinder -3, with sph. -1, -1.5, -2, -3, -4.
Spherical +1 with cyl. -2, -3, -4.
Spherical +2 with cyl. -3, -4, -5.
Spherical +3 with cyl. -4, -5, -6.

This collection was amply sufficient for all ordinary purposes, and the lenses could be delivered to the soldiers on the spot, instead of making them wait a whole month as in the French army.

The soldier receives at the same time a ticket showing his error of refraction, his correction, and his visual acuity. This ticket makes replacement easy, in case of loss or breakage. Besides, the physician of the corps can easily ascertain the visual acuity of the men with reduced vision and have them placed in positions where perfect vision is not called for. With an oculist at the front the number of days on the sick list can be materially reduced; and many can be kept in the regiments who would otherwise have to be sent to the rear. The following is a list of the affections treated in the Fifth Army Division during a period of six months:

LIDS.

Wounds	7
Contusions	12
Eczema	2

Blepharitis	22	Tabetic atrophy	1
Chalazion	27	Detachment of the retina.....	1.
Stye	40	AFFECTIONS OF GLOBE.	
Cyst	3	Contusions	4
Cicatricial trichiasis	3.	Wounds	5.
AFFECTIONS OF LACRIMAL APPARATUS.		TROUBLES OF MUSCULAR APPARATUS.	
Dacryocystitis	4	Convergent strabismus	6
Dacryoadentitis	1	Divergent strabismus	3
Obstruction of the tear passages...	20	Muscular paresis	3
Congenital anomaly	1.	Nystagmus	2
AFFECTIONS OF THE CONJUNCTIVA.		Muscular insufficiency	7.
Acute catarrhal conjunctivitis....	52	MISCELLANEOUS.	
Subacute and chronic conjunctivitis	136	Daltonism	1
Phlyctenular Conjunctivitis and kerato-conjunctivitis	19	Hemeralopia	50.
Trachomatous conjunctivitis	6	ERRORS OF REFRACTION.	
Vernal conjunctivitis	1	Myopia	129
Traumatic conjunctivitis	26	Hypermetropia	121
Self-inflicted conjunctivitis	15.	Simple myopic astigmatism	24
Conjunctivitis due to gas (quiet stage)	10	Simple hypermetropic astigmatism	27
Conjunctival ecchymoses	10	Compound myopic astigmatism...	36
Conjunctival adhesions	2	Compound hypermetropic astigmatism	16
Pterygium	5	Mixed astigmatism	16
Wound of the conjunctiva.....	1.	Irregular astigmatism	2
AFFECTIONS OF CORNEA.		Presbyopia	29
Ulcerating keratitis	2	Amblyopia ex anopsia	6.
Interstitial keratitis	1	The oculist is frequently called upon to determine the degree of service ability, in soldiers who claim to be disqualified. Often, again, the oculist is asked to pass judgment on soldiers accused of military offences and claiming defective vision or ocular trouble as an excuse. Soldiers in certain arms of the service, such as chauffeurs, aviators, signal corps members, are required to have normal vision, and here, again, it devolves upon the oculist to examine the candidates for these special services. An ophthalmologic service in each army division is therefore of great value, if not indispensable. It makes possible the early treatment of the wounded, and does away with the sending of a large number of men to the rear for treatment, choice of lenses, or expert opinion. It would add greatly to the efficiency of ophthalmologic, as well as of all the other specialties, if a wagon especially fitted for the specialist's needs, fitted with all the necessary instruments, were a part of each mobile army division. In this way the soldier would receive the benefit of the services of a specialist, to which he is entitled.	
Foreign body in the cornea.....	53		
Opacities, nebulae, leucoma	14.		
AFFECTIONS OF IRIS.			
Chronic iritis with posterior synechiae	2		
Acute iritis	6		
Iridocyclitis	1		
Heterochromia of the iris.....	1		
Iridodialysis	1		
Pupillary disturbances (tabes)....	5.		
AFFECTIONS OF CRYSTALLINE LENS.			
Operative aphakia	1		
Opacities of the lens.....	4.		
AFFECTIONS OF VITREOUS BODY.			
Old hemorrhages	2		
Recent hemorrhages	1.		
AFFECTIONS OF CHOROID.			
Tears	2		
Myopic choroiditis	9		
Traumatic choroiditis	1.		
AFFECTIONS OF THE SCLERA.			
Episcleritis	2.		
AFFECTIONS OF RETINA AND OPTIC NERVE.			
Opaque nerve fibres	3		
Syphilitic optic neuritis	1		
Posttraumatic atrophy	1		

AN OPERATION FOR KERATOCONUS WITH REPORT OF TWO CASES

A. S. GREEN, M.D., AND L. D. GREEN, M.D.

SAN FRANCISCO, CALIFORNIA

The operation here described and figured is a modification of the Lagrange operation for glaucoma. Read before the American Academy of Ophthalmology and Otolaryngology, October 17, 1919.

Of the various pathologic conditions of the eye for which operative procedures have been devised those for the relief of keratoconus have been among the least satisfactory. But if the literature be carefully scanned the conclusion must be reached that the most successful procedures have been those that have reduced the intraocular tension.

Thus, as far back as 1811, repeated puncturing of the cornea at the periphery was performed. Tyrrell later advised a peripheral iridectomy. Critchett produced a prolapse of the iris and ligated it. Von Graefe, Bowman, Swanzy and others either excised, trephined or cauterized the apex of the cone. All of these procedures, either intentionally or otherwise, lowered the intraocular tension temporarily or permanently.

Whether the cause of the protrusion be malnutrition, a refractive error, lid pressure or a disturbance of internal secretion either separately or collectively, it would seem to be self evident that the intraocular tension is too great for that particular eye altho apparently normal to palpation.

The beneficial results obtained from the use of myotics, as suggested by Jackson and others, would also tend to support that view.

Reasoning along these lines it occurred to the writers that a procedure that would permanently lower the intraocular tension and reduce excessive lid pressure, would check the progress of the disease.

METHOD OF PROCEDURE.

To overcome excessive pressure by the lids, we first do a canthoplasty—a suggestion made by Dr. Edmund E. Blaauw, severing the obicularis at its insertion by cutting the external canthal ligament. This is done on both eyes. The lids for the canthoplasty

are anesthetized by injecting five minims of $\frac{1}{2}\%$ novocain into the skin at the external canthus. Four or five drops of 4% cocain are meantime dropped into the culdesac at intervals of three minutes, a drop of adrenalin being added with the last drop of cocain. Three sutures are then put in uniting the conjunctiva to the skin at the external canthus. This practically eliminates excessive lid pressure.

The next step is on the eyeball. This is a modification of the operation done by Lagrange for glaucoma. A fold of conjunctiva is seized about one centimeter from the limbus above, incised horizontally and undermined as tho performing an Elliot operation, splitting the cornea with a slightly dulled keratome for a distance of about 2 mm. The conjunctiva is then pulled down and a small Graefe knife introduced at the limbus as for a cataract operation, coming out at the opposite side, the length of the incision being about 10 mm. The knife is carried slowly upward in the anterior chamber close to the root of the iris, leaving a crescent of sclera about 8 mm. long by about 3 mm. wide, attached to the conjunctiva. This shelf of sclera is cut off with delicate straight scissors. An iridectomy is next performed. The pillars are then straightened out, one suture inserted to unite the conjunctiva and the eye bandaged. The operation is practically painless and bloodless. The advantages of this procedure are that it has a tendency to permanently reduce intraocular tension, reduces corneal opacification, is not complicated, causes very little reaction and no additional scarring of the cornea. In parenthesis we may add that with the exception of the canthoplasty we have been performing this operation for glaucoma for the past two years.

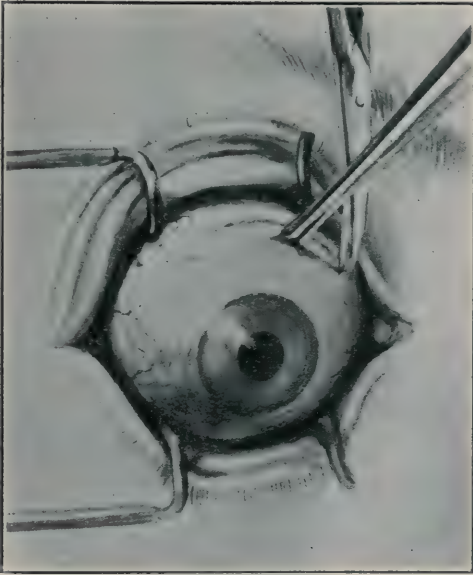


Fig. 1—Conjunctiva incised horizontally.

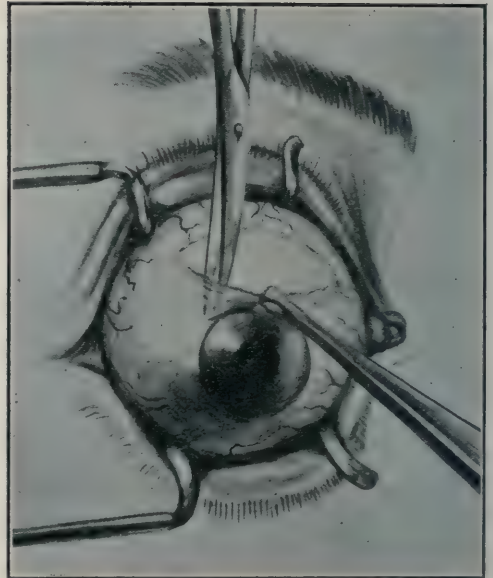


Fig. 2—Conjunctiva undermined to the limbus with sharp-pointed iridectomy scissors.

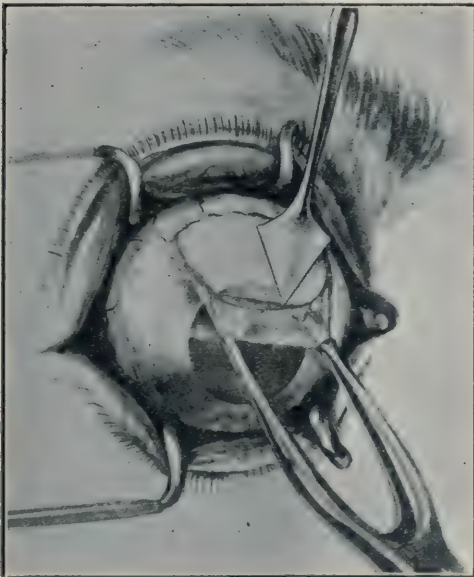


Fig. 3—Splitting of cornea with a slightly dull keratome for a distance of about 2 mm.

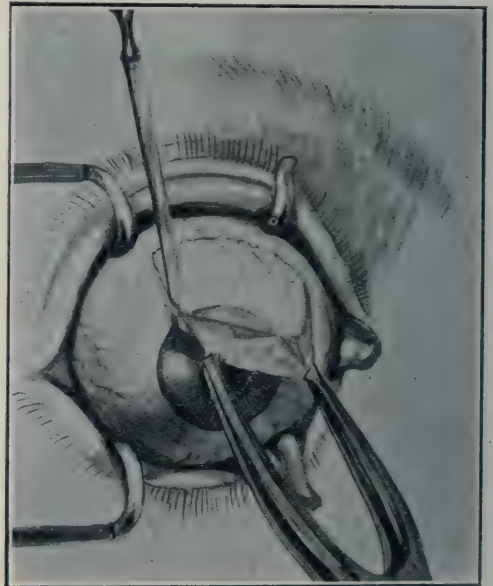


Fig. 4—The flap of conjunctiva pulled forward and a small Graefe knife introduced at the angle into the anterior chamber.

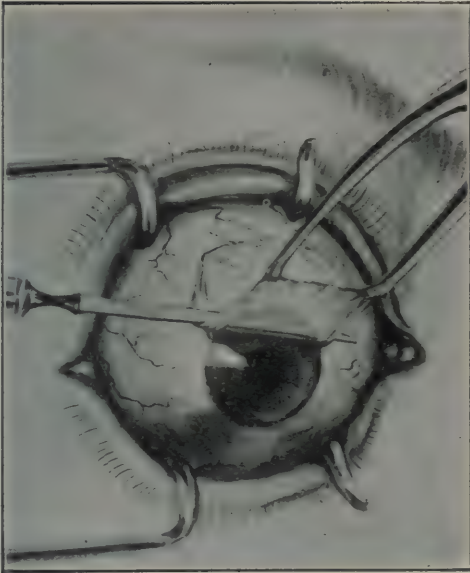


Fig. 5—Graefe knife within the anterior chamber, the point of counter puncture being about 10 mm. from the puncture, the knife being carried slowly upward, coming out above the limbus in scleral tissue.

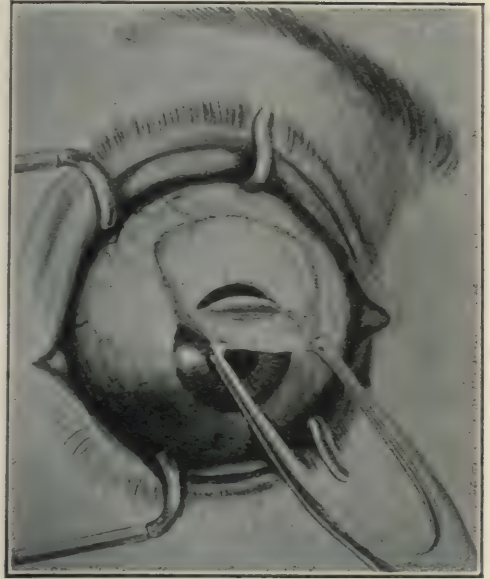


Fig. 6—Conjunctiva pulled forward, showing projection of sclera to be cut off.

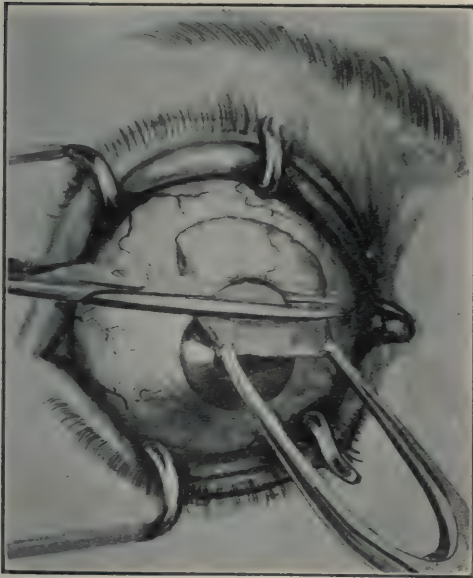


Fig. 7—Shelf of sclera is cut off with delicate straight scissors.

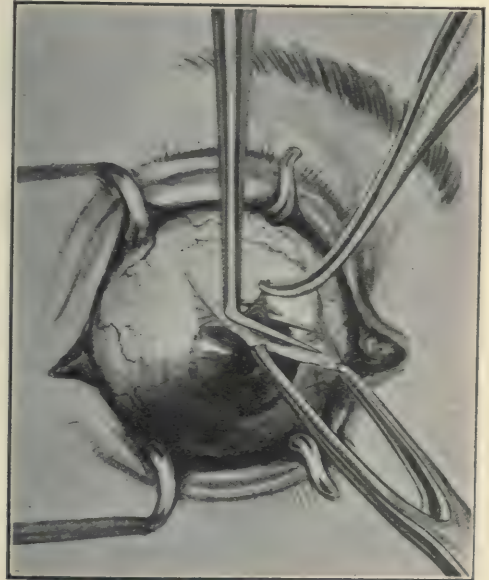


Fig. 8—Iridectomy.

The following two cases were operated upon by the above method:

CASE I. R. M. Male, age 24. Occupation, engineer. September 17th, 1918. History: measles at age of six. Poor sight since then. Wearing glasses about ten years.

Examination:

Right eye—3.50—4.50 ax. $90^\circ=4/60$.

Left eye—0.75+6.00 ax. $180^\circ=4/7.5$.

Marked conical corneas of both eyes. There was a nebula below the center of the right cornea. Correction of the refractive error and treatment with pilocarpin resulted in no improvement in the right eye but raised vision in the left eye to 4/6. As he was suffering from photophobia and headache an operation on the right eye was advised. This was performed by the above method on Oct. 12th, 1918, and on Oct. 18th, 1918, the patient was discharged from the hospital. There was very slight photophobia or injection.

Jan. 20th, 1919:

Right eye—2.00—2.50 ax. $60^\circ=4/10$.

Left eye+5.00 ax. $180^\circ=4/7.5$.

CASE II. Mrs. H. W. W., age 28. Jan. 2nd, 1919. History: Vision has been gradually failing for the past seven or eight years without apparent cause. Has always enjoyed good health. Has marked photophobia. For the past five years has been wearing:

Right—1.00+4.00 ax. 165° .

Left—1.00+5.00 ax. 180° .

Examination:

Right eye—1.50+4.00 ax. 165° and pin-hole=4/6.

Left eye—1.00+5.00 ax. 180° and pin-hole=1/30.

Right cornea conical but clear. Fundus normal. Left cornea extremely conical.

Under the corneal microscope the apex of the left cornea was found to be slightly flattened, about 4 mm. in diameter and below center. The corneal substance in that area appeared opaque, mascerated and distinctly thickened, having a spongy appearance with fluid in the interstices.

The left eye was operated upon Jan. 7th, 1919. On Jan. 9th the dressings

were removed and scarcely any reaction was present, while the cornea was considerably clearer than before operation. The stitches were removed on Jan. 13th and the patient discharged from the hospital. There was only a

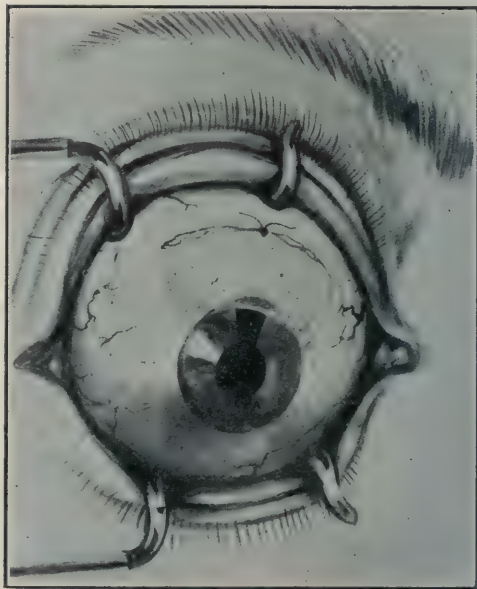


Fig. 9.—Pillars of iris replaced, conjunctival flap held in position by one suture. The small dark crescent-shaped area above limbus marks the spot from which the shelf of scleral tissue was removed.

faint nebula left at the apex.

January 15th:

Left eye+2.50 ax. $180^\circ=4/15$.

March 8th, 1919:

Right eye—.50+10.00 ax. $165^\circ=4/7.5$.

Left eye+2.00 ax. $180^\circ=4/15$.

Left cornea shows a very faint opaque line in place of the circular opacification.

In comparing the progress of the two eyes in the second case, it will be seen that in spite of the canthoplasty on the right side the astigmatism increased while the vision decreased, showing that reducing lid pressure is by itself insufficient. The astigmatism in the left eye on the contrary, was reduced to less than half of what it was before operation, while vision was markedly improved.

NOTES, CASES AND INSTRUMENTS

RECURRENT IRITIS ASSOCIATED WITH DERMATITIS EXFOLIATIVA.

SANFORD R. GIFFORD, M.D.

OMAHA, NEBRASKA.

A., a man of about 30 appeared at the University of Nebraska Dispensary on account of pain and loss of vision in the right eye for the past week. He showed iritis of moderate severity in the right eye, with small irregular pupil.

His history was interesting. Four years ago he contracted what he thought was poisoning by poison ivy, tho he was not sure of his exposure. It was attended by marked reddening and subsequent desquamation of the skin of both forearms and hands. Since then he has had similar attacks each autumn, and several times in the spring and summer. Besides the local symptoms, he has felt generally ill during the onset of the attacks, and thinks he has had a fever. The last two or three attacks have been accompanied by symptoms in the right eye similar to the present ones. Venereal history was negative. At present he shows a marked desquamation of the skin of both forearms and hands, large flakes of epithelium being partially detached, showing an inflamed dermis beneath. There are some raised blebs, but in most cases desquamation has occurred without previous bleb formation. The skin condition seems to be one of dermatitis exfoliativa.

The patient was prescribed atropin and heat locally, and large doses of sodium salicylat internally. He was told to return and also to report to the skin clinic. But he never appeared again, and could not be located; so that neither the opinion of a dermatologist nor a Wassermann could be obtained, and many other features of the case could not be worked out. The history of his skin trouble seemed to exclude syphilis as its cause.

Tho all the usual causes of his iritis could not be excluded, its association with the attacks of skin trouble was fairly definite. Whether the original attack was really due to *Rhus Toxicodendron* is rather uncertain; but it seems certain that this could not have been true of his later attacks. Stellwagon describes dermatitis exfoliativa as often occurring with acute systemic disturbances, fever, etc.; and as usually subject to recurrences after remissions of weeks or months. Tho usually more general, it is sometimes confined to the extremities. He says that arthritic symptoms and other complications occur in the chronic cases, tho the etiology is obscure, and tuberculosis has been invoked. Sachs and others think an autotoxic process is responsible.

I have seen no account of any form of uveitis associated with dermatitis exfoliativa; but the facts that arthritis occurs with it and that an obscure autotoxic or infectious process may be its etiologic factor, suggest that iritis may in this case bear the same relation to the underlying cause of the dermatitis as it usually does to a streptococcus infection, gonorrhea, syphilis, or tuberculosis; manifesting themselves in joints, glands, or other organs at the same time with the uveal affection.

AN OPERATION FOR TRICHIASIS.

Z. C. LAYSON, M.D.

FAYETTEVILLE, ARKANSAS.

To correct trichiasis especially where there is also considerable ptosis, as in those cases resulting from trachoma, I am using a method which I here endeavor to describe:

The skin incision is made parallel to and about 2 or 3 mm. above the lid margin. It extends along the entire length of the lid and divides the tissues down to the tarsus. The upper skin

flap so formed, together with the other tissues overlaying the tarsus, is dissected free from the tarsus up its superior border. The lower skin flap is then dissected free from the tarsus down to the lower or free border of the tarsus, and the dissection continued

eye and the newly made lower tarsal border is covered with conjunctiva.

Besides correcting the trichiasis the operation markedly obliterates the effect of the ptosis, causing the lid to appear well elevated.

LOSS OF INDUSTRIAL VISION.

WALTER N. SHARP, M.D.

INDIANAPOLIS, IND.

What is the percentage of loss of industrial vision? This is a question the court or industrial board asks when an employee's vision is considerably reduced by reason of accident to an eye.

We might ask the court what it considers as industrial blindness, or 100% loss of industrial vision; for without knowing this we cannot estimate the percentage of loss of vision.

The percentage of industrial vision has evidently been estimated too high; as most attorneys believe that if 20/20 equals normal, or 100% vision, then 20/40 must represent 50% loss of vision. We should then ask, upon that basis what would 100% loss of vision be?

The percentage of loss of vision is confusing to the employee, the attorney and even the oculist, and no uniformity of percentage can be attained until we use a uniform system of test-types and numerator; nor until industrial boards of the various states adopt a standard loss of vision to represent 100%.

A number of states, including Indiana, have concluded, by law, that 20/200 vision represents 100% loss of industrial vision. This being the case, then every foot lost must represent 0.5% less 10% for the numerator (20 feet) which is normal, or 100% vision, thus:

Loss of industrial vision.

20/200 =	10%	vision or	90% loss
20/150 =	35%	"	" 65% loss
20/100 =	60%	"	" 40% loss
20/80 =	70%	"	" 30% loss
20/70 =	75%	"	" 25% loss
20/60 =	80%	"	" 20% loss
20/50 =	85%	"	" 15% loss

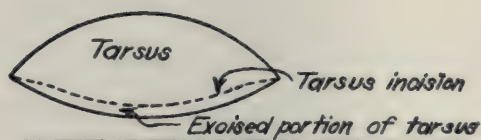
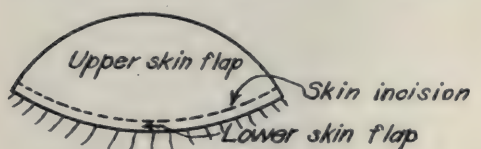


Fig. 1—Layson's operation for trichiasis.

around this lower border detaching the palpebral conjunctiva upward for about 2 mm. on the under surface of the tarsus. This strip of tarsus of about 2 mm. in width, and tapering at each end, should be dissected free throughout the length of the tarsus. This portion of tarsus freed is then excised. In freeing the conjunctiva from the tarsus because of the intimate adherence, the dissection must proceed carefully to avoid buttonholing the flap. Any fibers of the orbicularis remaining on the lower flap should now be excised with scissors. If there seems to be too great a redundancy of skin in the upper flap a small strip of it might be excised before placing the sutures.

The operation is completed by bringing the tissues together in the desired relations by three or four silk sutures. A curved needle is used passing from without inward thru the lower skin flap, then thru the tarsus alone at its upper border, then from within outward thru the upper skin flap. All the sutures are thus introduced. When they are tied the cilia portion of the skin is placed up and away from the

20/ 40 = 90% " " 10% loss
 20/ 30 = 95% " " 5% loss
 20/ 20 = 100% " " no loss

If one uses the metric measurements, as I do, the percentage of loss is the same. 6/60 representing 100% loss of industrial vision, we have a loss of $1\frac{2}{3}$ for every meter lost, less 10% for 6/6 or normal vision.

After I had completed my table I found that it corresponds with the table included in an article by Dr. Vernon A. Chapman and printed in the transactions of the American Academy of Ophthalmology and Oto-L. for 1917-18.

Should we compute our percentage of loss of vision upon the basis of 20/20 (6/6) as 100% vision, then 20/200 (6/60) would be but 54% loss; 20/100 (6/30) 24% loss; 20/40 (6/12) 6% loss; etc. These correspond with a table included in an article by Dr. Samuel G. Higgins and published in the AMERICAN JOURNAL OF OPHTHALMOLOGY, Nov., 1919.

What may be 50% loss of vision for one employee may mean 100% loss of vision for another, who is dependent upon a greater visual acuity to continue his vocation. I will leave this, however, for legislation to decide.

There is great need at this time to decide just what the percentage of loss of vision is, and just what it means to the individual employee. The latter can only be gotten at from an individual economic standpoint; and should be decided jointly, by oculists and the courts. The former should only be decided by oculists. I trust the time will soon come when we can have a standard basis upon which to work, also a test card for universal use, based upon metric measurements.

CATARACT PROBABLY DUE TO X-RAY EXPOSURE

OSCAR WILKINSON, A.M., M.D.

WASHINGTON, D. C.

Read before the Medical Society of the District of Columbia in March, 1920.

The case which I wish to present is one of double cataract in a woman only

40 years of age. The history in this case is negative up to two years ago. She first came to see me in October, 1917, complaining of failing vision and a slight irritation of eyes on use.

Examination revealed nothing abnormal about the eyes except a slight irritation of the conjunctiva, a low degree of astigmatism and a slight clouding of both crystalline lenses, more

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 marked in the left eye. R.V. = $-\frac{2}{20}$,

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 and L. V. = $-\frac{20}{30}$ with a low cylindric

correction.

A general examination of the patient by her physician revealed: blood normal, urinalysis negative; examination of tonsils, teeth and sinuses negative, and no digestive disturbance. No physical abnormality was noted except a very extensive lesion of lupus erythematosus, which covered a considerable portion of each cheek and a part of her nose.

It is to be noted that the patient is gray, and without further analysis one might consider the gray hairs and cataracts as marks of early senility. However, I learned on inquiring into her family history that her father became gray at 36, his sister was white-headed at 25, and this patient and her sister began to get gray as early as 17 years of age, and she was quite gray at 25.

I ordered correcting lenses, and gave stimulating eye drops of zinc sulphat and requested her to return in a month, at which time there was a very slow but decided increase in the lenticular opacities. I then advised a more vigorous treatment, which consisted in the use of dionin and mercury cyanid, a drop each night, with hot and cold fomentations three times a day and the use of K. I. and small doses of Hyd. Bichlo. three times a day after meals; and this was changed to iron and arsenic tonic treatment, when no improvement was manifested.

No progress being made, and in view of the fact that she had lupus, despite a negative reaction to tuberculin, she was given twenty injections of gradually in-

creasing doses of tuberculin R. without effect either positive or negative.

In my search for an etiologic factor, I learned from her that during the two and one-half years prior to her first visit to me, she had had her face exposed to the X-ray for the treatment of the lupus erythematosus. The first year she was treated every ten days, making a total of 36 exposures that year, and the second year and a half she had a treatment every two weeks, which would make 36 treatments. Allowing for some lapses or broken dates, it would be safe to estimate that she had more than 60 X-ray treatments; and at no time were the eyes protected with lead sheet, leather, or any filter. What is probably more significant, she states that she made a habit of looking at the small light in the Coolidge tube while she was being treated, thus exposing the lens to the ray with no protection except the transparent cornea and the aqueous humor.

Cataract has been produced by radiated heat. Cataract occurs more frequently in furnace workers and bottle workers than in other occupations less exposed to excessive heat.

In Mexico and other sunny climes cataract is much more frequent than here in the United States, and this has been attributed to the excessive sunlight. The natives of India are more frequently affected with cataract than we are here, and this has been ascribed to the excessive sun and heat and also to the fact that the cataracts in the natives of India contain an unusual amount of silicon.

Verhoeff and Bell were of the opinion that heat had more to do with the production of cataract than light. Burge made some experiments in which he showed that a lens exposed to ultraviolet rays, especially when the lens is charged with certain salts of calcium, magnesium or silicon, becomes opaque.

The elements in this case which would cause one to consider the X-ray as a possible etiological factor are:

1. Double cataract developing simultaneously in a case so young, without any constitutional or local evidence of disease.

2. The excessive amount of X-ray exposures, more than 60 treatments having been given.

3. No filtration of the ray, as evidenced by the fact that the patient could look at the small light in the Coolidge tube.

4. The eyes being uncovered, open and not even having the protection of the lid with the skin-muscle and cartilage.

With regard to the present condition of her eyes and vision, I would state that in August, 1919, I did a double simple cataract operation under local anesthesia, making large anterior openings in the capsules and after expressing the lens, the anterior chambers were thoroly irrigated with normal salt solution, the iris and the corneal flaps were coaxed into their normal positions,—a drop of eserine instilled, and the eyes bandaged for 48 hours.

The points in this case to which I wish especially to invite your attention are, first: Vision R. with correc-

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tion is —, and Vision L. with correc-

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tion is —. In the second place, the

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perfectly normal appearance of this lady's eyes. One might examine her casually and not even notice that she had ever been operated upon. Both pupils react to light and are almost normal in size; the right pupil a little larger than the left. Neither such a cosmetic nor visual result could have been obtained had an iridectomy been performed.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

ROYAL SOCIETY OF MEDICINE.

SECTION OF OPHTHALMOLOGY.

February 4, 1920.

President, MR. W. T. HOLMES SPICER,
F. R. C. S.

New Formed Vessels on Iris.

MR. G. WINFIELD ROLL showed a patient who exhibited such vessels on the iris. The history of the condition dated from infancy. The right eye had a number of vessels on the front of the iris, converging from the periphery to the margin of the pupil. The eye was blind, and somewhat disorganized, and it having recently become painful, the patient was anxious to part with it. The good eye showed areas of coloboma in the fundus, that below the disc appearing like a congenital one in the choroid. A floating band in the vitreous came forward to the back of the lens, but Mr. Roll was unable to trace it to its attachment. The patient was highly astigmatic, namely, 6/12 with prism. He asked for suggestions as to causation.

DISCUSSION.—MR. E. TREACHER COLLINS pointed out that some of the vessels of the iris seemed to turn round the pupillary border, others were in front of the lens capsule. He thought the condition was probably the persistence of the fetal vascular system. When the eye had been removed he believed there would be found a patent central hyaloid artery.

The President spoke of having seen a certain number of similar cases, and in one case it was inflammatory, an old iritis and cyclitis case, followed by increased tension. At that time he was not clear as to how far the prolonged use of eserine increased the growth of the vessels.

Detachment of Retina.

Dr. A. Hugh Thompson showed a case of macular detachment of the

retina, probably by new growth. His colleagues advised enucleation of the eye without delay. Four months ago, there was very little to see: the macula was not raised more than 2 D., and the diagnosis was by no means easy. Since then, however, there had been a regular grey detachment, and it was steadily increasing. There had not yet been any increased tension. If the cause was a new growth, it occurred exactly at the macula, which was not a common site for growths.

Pulsating Exophthalmos.

MR. H. GRIMSDALE showed a case of pulsating exophthalmos of 65 years standing: the case was exhibited in 1883 by the late Mr. Frost. It followed on a street accident. In the literature the statement was generally made that the prominent feature of these cases was paralysis of the third nerve. In the few cases he had seen, however, it was the sixth nerve which was most markedly paralyzed. This man had complete action of the third, but paresis of both sixths. In a case he recently saw, in which rupture occurred without traceable cause, the first symptom was diplopia, due to paresis of the external rectus. It was what one would expect, seeing that the sixth was lying well within the pressure area, so that its conductivity would be interfered with comparatively easily.

DISCUSSION.—MR. C. HIGGINS related two cases of the condition which came on during labor, and in a few months cleared up spontaneously.

MR. J. H. FISHER said the cases of the kind he had seen had not been notable for paralysis of any of the extraocular muscles, but he agreed that the sixth was the most likely to be paralyzed. He believed there were two classes of cases. The first were definitely due to a fractured base, which lacerated the carotid artery, and obviously the sixth, the nerve lying on the floor of the cavernous sinus, would be

the nerve most likely to be implicated, the third nerve, being higher in the sinus, would be likely to escape damage. In the second class of case he thought there was usually a history of a fall, rupture of a diseased artery being the first trouble, this disturbance of circulation resulting in the fall, the latter being therefore the secondary phenomenon. Here again the most likely nerve to be injured was the sixth.

Gunshot Wound of Occipital Lobes.

Mr. Norman B. Fleming showed a case of gunshot wound of both occipital lobes, with eye trouble. The wound was due to shell fire, and there was a deficiency of the vault of the skull over an area, roughly circular, $2\frac{1}{2}$ inches in diameter, in the mid-line, the lower part of the aperture being one inch above the inion. At the casualty-clearing station, fragments of bone and metal were extracted: there had been no later operation. He now complained of headaches, giddiness, slight deafness on the right side, and some loss of sight, tho central vision was acute. The eyes presented no objective abnormality. The visual fields suggested complete destruction of the dorsal part of each visual cortex.

DISCUSSION.—Mr. J. H. Fisher said such men when hit were, frequently, totally blind for days, and in lateral hemianopic cases there was direct laceration and damage of one half of the vision centre, and a concussion effect in the other half, causing some edema of nerve tissues, and punctiform hemorrhages, some of it capable of recovery, but a small amount not.

New Growth in Eye.

Mr. N. Bishop Harman showed a case of new growth in the eye of a boy, which members considered to be a glioma. The mother said she noticed the eye shone unduly when the boy was 14 months old. Now, the whole fundus was covered with a number of round bodies, of various sizes. A month ago, signs of irritation commenced. He proposed to remove the eye, but the parents were very difficult to persuade.

DISCUSSION.—Mr. Elmore Brewerton held strongly that any child under six years of age who had a white mass in the vitreous, with increased intra-ocular tension, should have the eye removed. This eye certainly showed an increased tension.

The Radical Cure of Gonorrheal Iritis.

MR. S. H. BROWNING said: gonorrheal iritis, being a late sequel of gonorrhea, was not usually seen first by venereal disease specialists, and was often not treated as a urethral affection. He contended that very few, if any, cases of gonorrheal iritis ought to occur, and certainly there should not be recurrent cases if proper treatment were carried out. His object in reading the paper was to show that by thoro treatment of the genitourinary tract in subjects of gonorrhea, the iritis would be permanently cured.

He regarded gonorrheal iritis as a toxic condition, that it was not due to the actual presence in the eye of the gonococcus. In only one case had the organism been isolated from the eye itself; and that was in Sidler-Huguenin's case, in which it was discovered in the bloodstained exudate from the anterior chamber of a case of gonorrheal septicemia. The author had himself tried many times to cultivate the organism from the exudate within a few seconds of it being drawn off, but had always failed.

In these cases there was usually a history of gonorrhea some years previously: he had never seen a case of iritis during the acute stage of urethritis, and others had confirmed this, on the observation of many thousands of cases. There is, in these cases, a specific reaction to gonorrheal vaccines. It is not invariably associated with gonorrheal rheumatism. There is a recurrence of the iritis, or an exacerbation of the symptoms after prostatic and vesicular massage, probably on account of toxins being thereby liberated into the blood stream. The diagnosis is also helped by eliminating such sources of infection as pyorrhea, septic tonsils, ear trouble, cystitis, and alimentary affections. The complement-

fixation test had not given reliable results in his hands.

He considered treatment under two heads: preventive and radical. The first of these rested with those who saw such cases early. He laid great stress on the need for thoroughness at the hands of a genitourinary specialist, for in that case he believed there would be no such condition as gonorrheal iritis. Tho vaccines did not materially shorten the acute stage of the disease, complications and sequelae were largely prevented by their use.

The radical treatment should consist of: (1) Immediate treatment by the ophthalmic surgeon, (2) the immediate use of vaccines, (3) continued treatment by vaccines and prostatic and vesicular massage, with, if necessary, treatment of the urethra. While an autogenous vaccine is being prepared, he urged the use of suitable doses of a reliable mixed vaccine. Some of the loss of repute of vaccine therapy in this connection, he attributed to the haphazard use of commercial vaccines. The proper dose of vaccine varied with each patient: his own range of experience varied between five millions and five hundred millions. Vaccine therapy was no more than an aid to medical and surgical treatment: it was not a substitute.

The author then proceeded to outline the proper method of carrying out massage of the prostate and vesicles.

He did not think iritis was often due to other bacteria found after massage, such as staphylococci, *B. Coli*, diphtheroids, etc. He had not met with a case of gonorrheal iritis in a female. He narrated the leading facts in the histories of ten cases which he had carefully followed out, and which bore out his contentions: he had notes of 47 cases of the condition.

DISCUSSION.—Mr. C. H. Mills strongly urged that no form of massage should be commenced until the acute stages of the iritis had subsided. The same remark applied to vaccine injections. Again, vaccine injections should never be given when massage was being carried out, because the latter expressed into the general circulation a

large dose of toxins; that was especially important if the toxins had not been detoxicated. Men who had pyorrhea as well as gonorrhea seemed very likely to have joint troubles and other evidences of metastasis. But all cases of iritis which had a septic focus in the prostate or vesicles were not necessarily gonorrheal iritis; even tho, years before, the patient might have had gonorrhea. He believed that in many of the cases the original gonorrhea died out, but a mixed infection succeeded and flourished on the areas originally damaged by the gonococcus. Colonel Young, of the American Army, had been conducting a research on rheumatoid arthritis, and he was keen on tracing some connection between this and chronic vesiculitis. From 300 subjects of rheumatoid arthritis he had excised the vesicles, and from most of them he had isolated a streptococcus. Mr. Mills considered that in towns and cities 80 per cent of the adult population had had gonorrhea at some time of their lives. The cases of iritis which did best with vaccine treatment were those in whom it occurred within about three years from the infection, for these people seemed capable of a generous manufacture of antibodies.

DISCUSSION.—Mr. C. Higgins related two cases in which the disease in the eyes ceased to recur at about sixty years of age. One had vaccine treatment, the other did not. He attributed the cessation at that age to the patient having by then used up his stock of toxin, and not placing himself in the way of receiving a fresh supply.

Mr. Bishop Harman raised the question of carriers of the gonococcus, especially in its relation to marriage.

Mr. C. B. Goulden and Mr. William Lang continued the discussion.

Mr. Whiting spoke of the marked negative phase which occurred after giving a vaccine, and which was sometimes alarming, tho he had seen no ill consequences from it. It was followed by a very definite positive phase. He urged the importance of thoro treatment of the gonorrhea at the hands of specialists.

PITTSBURGH OPHTHALMOLOGICAL SOCIETY.

February 9, 1920.

President, E. B. HECKEL.

Dermoid Cyst of Orbit.

DR. EDWARD STIEREN exhibited a patient, a young married woman, twenty-three years of age, presenting a pronounced exophthalmos of the right eye, with a displacement downward. There is no diplopia and the rotations of the affected globe are normal, aside from a

carefully separated from its periosteal attachment and removed en masse.

The lacrimal gland had been forced out of its fossa by the growth and was found to be prolapsed. The major gland was removed, leaving the accessory gland in situ. Perfect union of the soft parts resulted, with practically no surgical reaction and the cosmetic result today is perfect, the scar being hidden in the normal fold of the lid. When sectioned, the growth was found to contain much caseous ma-



Fig. 1.—Dermoid cyst of orbit. (Stieren.)



Fig. 2.—Dermoid cyst of orbit. After operation.

limitation of upward movement. The condition first became noticeable when she was five years of age and has advanced steadily since. A hard non-fluctuating mass can be felt in the upper, outer portion of the orbit.

Under general anesthesia an incision was made, beginning at the middle of the upper rim of the orbit, in the sulcus of the upper lid, and extended outward and downward to the external angle of the orbit. Dissection revealed a spindle shaped, smooth, encapsulated growth, with its greatest diameter well under the roof of the orbit at the outer angle and extending backward toward the apex. The growth was

terial and a large number of short hairs resembling cilia.

DISCUSSION.—Dr. Edward Weisser reported that he had operated a similar case several years ago. Dissection showed a large, relatively superficial cyst, and a number of smaller cysts more deeply placed in the orbit. He removed the large cyst, leaving the smaller ones in situ. The cosmetic and functional results were perfect.

Nonmagnetic Foreign Body in the Lens.

DR. JOS. STEIN reported that about four months ago, while chiseling an automobile gear housing, the patient

was struck in the left eye by a small fragment of metal. The patient said that there was not much reaction, but that the vision of the eye is failing. Examination disclosed a small scar of the cornea 3 mm. from the limbus on the XII o'clock meridian. The lens shows beginning opacity, and a minute, faintly glistening foreign body can be seen on the posterior capsule. Use of the Sweet and giant magnets made no impression on the foreign body. X-Ray examination shows the object to be 3 mm. posterior to the center of the cornea and in the vertical meridian. The object is undoubtedly metallic but may be nonmagnetic.

DISCUSSION.—Dr. Heckel advised removal of the foreign body with extraction of the lens as soon as it becomes more opaque.

Dr. Stieren related an experience with a similar case. A man had a very small spicule of steel in the periphery of his lens; vision was 20/30 and the eye was quiet. The patient was told of the danger of cataract should the foreign body be removed. The eye remained quiet and had good vision for three years. It then developed a low grade iridocyclitis and vision was lost after $4\frac{1}{2}$ years. Enucleation then became necessary.

Nevus at the Internal Canthus.

DR. ADOLPH KREBS exhibited a female infant in whom one week after birth, a small, red spot was noticed in the skin at the inner canthus of the right eye, which has gradually increased in size.

DISCUSSION.—Dr. Heckel advised treatment of the nevus by electrolysis. Dr. Murray spoke of the danger of fulguration in treating growths, etc., about the eye. He cited the case of a woman who had undergone this treatment for a papilloma on the lower eyelid, and who, three days later developed a sloughing of the cornea.

Transplantation of Superior and Inferior Recti Fibres for Convergent Strabismus.

DR. H. H. TURNER exhibited Mrs. W. A., aged 54, housewife, who was injured in an automobile collision Jan-

uary 2, 1918. When she regained consciousness four days later, she had a complete paralysis of the external rectus left eye, with a very marked convergent strabismus and diplopia, and was under care of family physician from time of accident until February 9, 1918.



Fig. 1.—Complete Paralysis of abducens. Turner's Case.

The examination at that time showed a complete paralysis of the left external rectus, with a convergent strabismus, so marked that the cornea was partially under cover. The ophthalmoscopic examination was entirely negative and the visual acuity:—R.E. 20/20. L.E. 20/70. The diplopia was so confusing that the patient found locomotion impossible without occlusion of the deviating eye.

The patient was put on K.I. and mercury, which were continued until July 2, 1918, without any return of function to the paralyzed muscle. July 2, 1918, the eye was operated under novocain and adrenalin anesthesia. A curved incision was made thru the ocular coverings, beginning at the insertion of the superior rectus, passing midway over the insertion of the external rectus and terminating at the insertion of the inferior rectus.

The tissues were dissected back exposing the tendinous insertions of the three muscles. The superior and inferior recti tendons were then split, the temporal halves freed and sutured (using 00—10 day chromic gut) under the tendon of the external rectus, which was not otherwise disturbed. The incision was then closed, the conjunctival sac filled with White's ointment, and both eyes bandaged.



Fig. 2—Result of transplantation of tendons in complete abducens paralysis.

The occlusion of both eyes was continued for eight days, with inspection and cleansing of the operated eye on alternate days. There was considerable operative reaction, which quieted within a few days.

On October 15th there was parallelism for distance and a vertical imbalance of 6 degrees, which remains unchanged to date.

She was ordered R.E. Prism 2 degrees—Base up. L.E. Prism 4 degrees,—Base down.

Altho the abduction still leaves something to be desired, she has binocular fixation, except to the extreme outer portion of the field, is but rarely conscious of any diplopia, goes about her household duties, and shops in the city with perfect comfort.

DISCUSSION.—Dr. Edward Stieren referred to the unsatisfactory results usually obtained in these cases, and the question as to the best procedure to follow. He stated that he has been accustomed to make an advancement of the external rectus and has secured excellent cosmetic results, altho there is usually considerable difficulty with diplopia later.

Dr. Heckel suggested that it might



Fig. 3—Result of operation in Turner's Case.

be possible to increase the abducent action of the transplanted muscles, if the tendons could be attached to the sclera, above and below the insertion of the external rectus, respectively, well forward, the tension being relieved by a guy suture to be left in situ for several days.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

December 15, 1919.

DR. WM. L. NOBLE, President.

Loss of Vision Despite Restoration of Normal Tension.

DR. E. V. L. BROWN reported the case of Mrs. McC., aged 75. The left

eye was trephined 33 months ago. "Late infection" occurred 6 months later, but the eye healed with good central vision, a satisfactory form field, and tension of only 15. This status was maintained for 8 months more; when the vision suddenly dropped, from 6/10 to between 3/10 and 4/10 in the course of 4 weeks. The tension did not rise and the fields were little smaller. Four weeks later, the fields had narrowed to about 1/6 of what they had been; altho tension remained at 15. The patient was still able to get about by herself, tho no longer able to read print.

This relatively favorable status continued for about 10 months, when within a period of 27 days the central vision dropped from between 3/10 and 4/10 to less than 1/10, despite tension of only 9. In the last six months the patient had to be led about, and to all intents and purposes was blind from a glaucomatous process in which tension had not been found above 15 since she had a vision of 6/10, 33 months before.

Attempted Trephining by Purtscher's Method.

Mrs. R. B., aged 56, Jewess. The left eye suffered an acute attack of glaucoma 14 years ago. An iridectomy was done the next day and vision was restored to about what it had been before. L. V. is now 1.5 and Schiötz only 18, altho the nasal fields are almost gone, and temporal ones decreased to 1/4 normal.

Right V. failed suddenly in December, 1914, without pain. Widespread hemorrhagic retinitis was found 5 weeks later, but with a very shallow anterior chamber. Pupil dilated, oval and fixed, atrophic iris, 3 D. cupping of the disc, extending to the scleral ring, from 7 to 12 o'clock, with undermining at 12 o'clock. R. V. 6/200, form field concentrically reduced to about 1/10; tension had risen to R. 33 (L. 18). The disc was cupped 5 D. in the temporal half but none in the nasal half; 14 days later the nasal half was found cupped 2 D. under a tension of 31. (L. 16); R. V. = 8/10. Operation advised but refused.

Miotics were continued, and this normal central vision held for 28 months longer. The patient then absented herself from the clinic for 16 months, returning with tension 60 (L. 18), "completely and totally" cupped R. disc; R. V. = perception of light only. Almost no anterior chamber remained. The possibility of an acute attack in this eye was explained to the patient and she consented to a decompression operation.

Purtscher's double trephining was undertaken, in the hope of securing a flat, nonvesicular covering for the wound tract. A large conjunctival flap was made, the cornea grooved some 2-3 mm. above, and a 3 mm. von Hippel trephine put in position, with the intention of cutting thru merely the outer half of the sclera; and only that part lying under the upper circumference of the cutting edge of the trephine. To do this one pressed against the sclera with the part of the cutting edge lying away from the limbus.

A disc of outer layers of sclera was then dissected away from the inner half of the sclera but was left attached on the side nearest the cornea, and this attachment acted as a hinge for the scleral flap. It was then held aside and a 1.5 mm. hole trephined thru the remaining inner layers of the sclero-corneal tunic with an ordinary instrument. An iridectomy was then done and the hinged outer half disc of sclera allowed to go back with the inner trephine opening, and the conjunctiva replaced.

In this case the sclera was so thin that with the first revolutions of the von Hippel instrument the cutting edge went thru the entire thickness of the sclera, except the lower circumference; this was not cut and served as a perfect hinge. The ciliary body and some iris presented and was excised. A small amount of vitreous followed. The conjunctival flap was replaced. Healing had been uneventful, but the eye was still red and had a high tension.

Purtscher spoke of having performed the operation in only a few cases. Meller was well enough impressed with Purtscher's presentation to say it

should be given a thoro trial. He had given up Elliot's operation, except in older people, because vesicular scars resulted, and so frequently were eroded by lid action and led to late infection. The writer had also seen four late infections and had done as few trephinnings as possible since 1914. He therefore welcomed the Purtscher modification, but felt many scleras would be found too thin to go half way thru and no further, with a von Hippel instrument. He would try a hand trephine in another attempt.

Primary Acute Congestive and Subacute Glaucoma.

DR. CHARLES MAGHY reported on 100 cases treated at the Royal London Ophthalmic Hospital in 4 years, with the visual results. The classification followed was that of Colonel Elliot. Many of the acute cases, however, showed that a condition of chronic glaucoma existed in the other eye at some period. No attempt was made to divide the cases into the various stages. Aside from operation, the treatment was the same for each case, with the exception that most of the severe cases had leeches applied. Oily solution of eserine, 1 per cent, was used two or three times a day, during the first 24 hours, followed by the aqueous solution, $\frac{1}{2}$ per cent, three times a day.

Aspirin was occasionally given in large doses. Morphin was seldom resorted to for the pain. The operated cases received calomel and salts, except those taken direct to the operating room from the out-patient department. In all the trephined cases the Lang $1\frac{1}{2}$ mm. instrument was used, after being tested with fine kid and examined with a binocular loupe. Most cases had one fine black silk stitch in the conjunctival flap. A few cases had a Herbert's sclerotomy, but nearly all the acute cases had an iridectomy, the iris being torn out after being severed at one edge. A narrow Graefe knife was used to make the section.

Following the operation, atropine sulph., $\frac{1}{4}$ per cent, was instilled in the operated eye by some surgeons; in other cases it was not used until the second

day. Only the operated eye was bandaged. The tonometric tension was seldom recorded prior to operation. Fields were taken where the vision would permit. Many of the cases did not attend the hospital for many months after being discharged, so it was impossible to keep a record of their progress.

In the 87 patients there were 103 eyes with acute or subacute glaucoma. The cases with chronic glaucoma in the other eye were merely mentioned, with a note of the vision and condition of the optic disc. The right eye was involved in 48 and the left in 55 cases. There were 24 males and 63 females. As to age, one case was 25, 2 were 31, 20 were between 40 and 50, 21 between 50 and 60, 37 between 60 and 70, 14 between 70 and 80, and one between 80 and 90 years.

Influenza was present or preceded the attack in 4 cases, rheumatism in 4, and 3 cases had pyorrhea very badly. In 2 there was a history of injury before the attack set in, and 5 cases showed a postoperative injury. A hyphema developed in 8 cases. In only 1 case was the iris pillar prolapsed and it remained in place after the use of an iris repositor.

The cases admitted without treatment numbered 61. Boric lotion was used by 13, atropine by 4, and eserine by 8 of the cases. Previous attacks were noted in 74 cases, while 26 came to the hospital during or just after the first attack; 65 patients saw rainbows, and 46 vomited with their attacks. A few patients were nauseated but did not vomit.

Acute congestive glaucoma was present in 69 cases and subacute in the balance. Of the 63 iridectomies, the iris pillars were drawn up to the wound in 4, not including the one that prolapsed. In the 35 trephined cases, the disc fell into the anterior chamber in one, without causing symptoms of irido-cyclitis. A Herbert's sclerotomy was performed in 1 case, and 1 case was eviscerated following infection. Three cases were unoperated and 1 refused operation.

The fundus was obscured by lens opacities in 7 and by vitreous opacities in 11 cases. In many of the latter cases, however, the fundus was seen at a later date. In 1 case the eye converged 20 degrees. In 2 cases the choroid was detached, but only for a few days. Retinal detachment occurred in two cases and persisted. Retinal hemorrhages were present in at least 3 of the cases, and in each case near the optic disc.

In 16 cases the optic disc was cupped. No cupping was seen in 75, while in the remaining cases the fundus was obscured. Vitreous opacities were present in 33 cases, altho in many the opacities were very fine and disappeared later. The nasal field in 11 was contracted from 5 to 30 degrees. Two cases showed a concentric contraction, one of 10 and the other of 20 degrees. In 4 cases no contraction was present, while in the remaining cases no field could be obtained, owing to the great reduction in vision at the time of entrance to the hospital.

The lowest tension prior to operation, recorded with a Schiötz tonometer, registered 25 mm. Hg., and the highest 42. In 9 of the cases the fellow eye had been operated upon for chronic glaucoma and in 3 for acute glaucoma at some previous period.

In a review of the literature of the past ten years, covering the period since the modern decompression operations were introduced by Lagrange and Elliot, the speaker had considered only those authors who had reported 10 or more cases. Many oculists had not given the details of their cases so that a comparison could be made.

One had to confine comparisons with the cases reported by Stock and Meller. Col. Elliot was unable to furnish his statistics for comparison with the above authors, and those of the Moorfields hospital staff.

The following table gives a comparison of Stock, Meller and the author, showing the vision on discharge; and the cases that improved, remained stationary or became worse. The cases included under the title "author" were operated upon by the following men—Treacher Collins, Holmes Spicer, J. B. Lawford, J. Herbert Fisher, J. Herbert Parsons, Percy Fleming, Claude Worth, A. C. Hudson, Foster Moore and Malcolm Hepburn.

DISCUSSION.—Dr. William H. Wilder stated that in chronic glaucoma it was important to consider the peripheral vision. Unless this was done one might fail to recognize changes going on as a result of the increased intra-ocular pressure.

In chronic glaucoma central vision was frequently maintained, while peripheral vision was gradually lost. The danger was probably greater in the eye that had a large physiologic cupping of the optic disc. The increased intraocular pressure might force the vitreous back into this normal depression, and more quickly make an abnormal cupping, with consequent impairment of peripheral and even central vision.

It was not uncommon to see acute cases restored to normal vision by timely operation for relief of the pressure.

It was also valuable to study the condition of the blind spot of Mariotte. The observations of Bjerrum, Seidel

RESULTS IN ACUTE GLAUCOMA.

Cases			VISION	Improved S. M. A.			Stat'y. S. M. A.			Worse S. M. A.		
S.	M.	A.										
4	0	10	Lt. Perc. to hand movements	0	0	0	4	0	3	0	0	7
3	4	12	Hand movements to 1/60	1	3	4	2	0	5	0	1	3
2	1	21	1/60 to 6/60	2	0	18	0	0	3	0	1	0
2	0	31	6/60 to 6/18	1	0	31	1	0	0	0	0	0
3	0	9	9/18 to 6/12	1	0	9	1	0	0	1	0	0
0	3	11	6/12 to 6/9	0	3	11	0	0	0	0	0	0
8	3	9	6/9 to 6/6	3	0	6	2	2	3	3	0	0
22	10	103		8	6	79	10	2	14	4	2	10

and others had shown that an enlargement of this blind spot frequently could be demonstrated in the early stages of glaucoma, and as the condition progressed the enlarged blind spot tended to merge with other blind areas in the field.

The contention of Schweigger and Schnabel that many of the so-called simple glaucomas were optic atrophy had not been definitely proven, and tonometric examination of such cases revealed that the tension might be elevated at times. However, the presence of spaces in the nerve head, such as Schnabel had described might allow a lower intraocular pressure than equal to cause cupping of the disc, and exert an effect on central as well as peripheral vision. Some such process might account for the peculiar variations from ordinary types, that were described in some of Dr. Brown's and Dr. Carr's cases.

Those who advocated the use of miotics to the exclusion of operative measures urged them for cases that showed no active or congestive stages. But even in so-called simple cases, there might be variations in the degree of the intraocular pressure, demonstrated by repeated tonometric variations.

A safe working rule might be to rely on the miotic treatment only as long as it kept the intraocular pressure down to the normal, as indicated by the tonometer, and as long as the central and peripheral vision were maintained and the blind spot of Mariotte showed no marked increase. If the case showed any congestive phases and the tension could not be held to normal and the peripheral vision showed decrease, the patient should be informed of the danger and more radical procedures should be resorted to.

The excellent presentation by Dr. Maghy showed that iridectomy offered one of the best methods of treatment in the acute cases, but many men believed that for the chronic forms, something was lacking in iridectomy, and we must resort to some other form of operation.

Dr. Oscar Dodd was much interested in the patients who had loss of vision after reduction of the tension. In two cases which he had trephined with success, the tension came down to normal, but the vision decreased and the condition was apparently growing worse. Careful examination showed that in each case there was focal infection from the teeth, and when this infection was cleared up the vision returned to practically normal. He felt that it should be kept in mind that in glaucoma cases there were other things to be considered besides the eye symptoms.

Dr. Oliver Tydings agreed with Dr. Dodd. When the disc was blurred as Dr. Maghy mentioned it pointed to some inflammatory action. Vomiting pointed to toxemia of some kind. In one case there was detachment of the retina, in another retinal hemorrhage, the fundus was obscured in certain cases. While these things might and did exist in connection with glaucoma they were undoubtedly due to other factors than glaucoma *per se*.

He cited several cases which had been treated by eserine and pilocarpine, and had afterward cleared up to practically normal under the careful use of atropine. In one case he had followed this treatment with scopolamine and atropine and the vision was now 10/200 against fingers at 2 feet. He believed that in every case of glaucoma there was toxemia due to focal infection as a causative factor.

Dr. Francis Lane said the anatomic explanation for the permanent contraction of the field was a degeneration of the more anterior ganglionic cells of the retina. The peripheral cells appeared to possess less power of resistance to pressure and consequently were the first to degenerate. He had observed vacuoles in these cells at this location, which did not differ in appearance from those described following optic neuritis. All fibers of the optic nerve had ganglionic cell attachments in both the retina and the brain, so if in glaucoma the primary lesion lay in the ganglionic cells of the retina,

the changes in the nerve must be regarded as ascending atrophy. Optic nerve fibers did not follow the Wallerian law, because they had two centers.

The enlargement of the blind spot in glaucoma must also be explained on anatomic grounds. The lamina vitrea was the only structure of the retina and choroid which touched the optic nerve fibers. If glaucomatous excavation was present it could well be understood how this membrane could be subjected to traction or wrinkling at its border; thereby causing an anatomic disturbance of relationship of the rods and cones in the immediate vicinity, which would account for the increase in size of the blind spot.

Dr. Harry Gradle said that non-inflammatory glaucoma was manifested by increased intraocular tension, due to increased secretion or to retarded outflow. The latter could be estimated by massage. Following two minutes of deep massage, the normal eye was reduced in tension about 8 or 9 mm. of Hg; if the reduction in tension was less than 4 mm., it might be said that the outlets of normal circulation were so blocked that a restoration to normal conditions could not be produced by miotics alone, and that operative interference would have to be resorted to.

The reduction in vision under increased intraocular tension was due to many factors, two of which were pressure upon the nerve fibers as they crossed the unyielding scleral ring, and pressure upon the ganglion cells in the periphery. When the nerve fibers were subjected to uniform pressure, the first to yield were the most delicate ones, and there was a reduction in central vision. If the pressure upon the scleral edge alone was the cause of the reduction, there would naturally be a greater reduction of central vision than of the visual field; but the reverse was true, showing that other factors were of greater import.

Dr. Michael Goldenburg was impressed with the cases reported by Dr. Brown. Vision kept going downward in spite of any method of treatment.

He thought probably the same conditions which produced arteriosclerosis had some relation to the production of glaucoma—some very insidious process going on in the body over a very long period.

The fact that every glaucomatous eye that came under the microscope disclosed an infiltration into the spaces of Fontana, root of iris, and frequently adhesion of irids to cornea, cutting off drainage was very significant. He was inclined more to the belief that focal infection produced a serious iridocyclitis with a so-called secondary glaucoma.

Dr. Maghy said he had seen 500 cases of eyes trephined, and had only seen two infections. The Elliot technic was not always used at the Moorfields Hospital surgeons. The disc in every case was taken out, and usually an iridectomy was done. He had seen many cases in which the conjunctival flap was torn, but they did not come to infection. There was just a root iridectomy.

Dr. Brown agreed with Dr. Wilder that more fields should be taken; also he would urge that disc and tension changes be followed more carefully. He agreed too that when congestive attacks occurred the miotic treatment should be given up and operation performed. Yet he was not satisfied with any of the operations, and advised miotics as long as central vision, fields, and tension could be maintained in statu quo. He did not agree with Dr. Maghy that late infections after trephining were due to faulty technic, altho he was at a loss to understand why there should be so few cases of late infection in England.

Retinal Folds Following Cellulitis.

DR. ROBERT VON DER HEYDT presented a patient who showed wrinkles in the form of vertical folds in the macular area.

The patient was a boy aged 11 years who had cellulitis several weeks previously, following which the wrinkles appeared in the left eye. The right eye was negative, so he was no doubt dealing with an immediate after result

of the cellulitis. There was evidently a clouding of the retina.

Such cases were rare in the literature. Vogt reported vertical reflex lines, and one case of vertical folds following cellulitis in an 18-year-old boy. Other observers had reported folds but not presenting a vertical direction. Examination with the red free light showed these to be real folds. He thought the fact that the folds were not more often seen was because they probably were transient in character and only occurred in young individuals. There was no lowering of visual acuity in this eye. No metamorphopsia was observed.

COLORADO OPHTHALMOLOGICAL SOCIETY.

January 17, 1920.

DR. W. C. BANE presiding.

Cyst in Anterior Chamber.

G. L. STRADER, Cheyenne, Wyoming, presented a boy aged 14 years, who in August, 1918, had been struck in the right eye with a stone thrown from a sling. When the boy was first seen by Dr. Strader two days later there was an incised wound 5/16 inch long at the upper outer corneal margin, with a prolapse of the iris and the anterior chamber was filled with blood. The wound was covered with a sliding conjunctival flap and the iris prolapse was not disturbed. Five days later it was found that the flap had pulled loose. The margins of the wound were touched with trichloroacetic acid, and the flap again pulled over the wound. The eye subsequently did well, and light perception and projection remained good. The patient was not again seen until January 5, 1920. About ten days previously the eye had become irritable and watery, and there was a great deal of photophobia. The eyeball was red but not very painful, the tension normal, and the upper outer fourth of the anterior chamber was occupied by a rather dark mass, the lower edge of which was of circular outline, resembling a lens margin. One or two blood vessels could, however, be seen

on the anterior surface of the mass, and reflected light showed it to be partially transparent. The condition appeared to be one of epithelial cyst secondary to the penetrating injury.

DISCUSSION.—G. F. Libby, Denver, thought the appearance was very suggestive of an inclusion cyst.

W. H. Crisp, Denver, felt that the mass was a cyst, its margin being too regular for that of a lens without its capsule, and the mass being too small for the lens within its capsule; and the diagnosis being also favored by the presence of the blood vessels and by the relatively transparent appearance.

Edward Jackson, Denver, suggested excision of as much of the cyst and of the adjoining iris as possible thru an opening into the anterior chamber. On opening the cyst thru the cornea, the tendency would be for the contents of the cyst to escape, and for the cyst wall to be cut off, but it might be better to attempt excision of as much of the iris as possible.

C. E. Walker, Denver, recalled a case of cyst of the iris in an old lady. She had also a cataract, and the cyst and the cataract were removed at the same time, including the iris on both sides of the cyst. She had no further trouble. The cyst was in the corneal section made with an iridectomy knife above, and was not ruptured in doing the operation.

Dr. Strader did not believe that there was any lens in the eye, because he thought he could see some opaque capsule in the tiny chink which was all that was visible of the pupil.

Glaucoma Secondary to Iritis.

W. A. SEDWICK, Denver, presented a married woman of 59 years whose right eye was greatly inflamed, the cornea being hazy and anesthetic, the anterior chamber somewhat shallow, the pupil occluded, and the tension plus 1. At the circumference of the iris were a number of petechial patches. The eye was not painful except to touch. The patient had suffered for fourteen years from a polyarthritis, which had caused a certain amount of deformity of the hands and feet. All

the upper teeth had been removed twenty years previously, and the lower teeth two years previously, the rheumatism having apparently been somewhat benefited as a result. The right eye had been red and swollen at various times during the past twenty years, with very little treatment. Nine months previously the patient had had a severe attack with vomiting, loss of appetite, and severe pains thru the temporal region. Since then the eye had never become white, and three weeks ago the present attack had begun. There was an argyrosis from prolonged use of argyrol. The case was probably one of acute glaucoma secondary to repeated attacks of acute iritis. There seemed little to do but remove the eye.

DISCUSSION.—J. A. Patterson, Colorado Springs, would have all the sinuses x-rayed before having the eye removed if it were his eye.

G. F. Libby, Denver, recalled a very similar case, in which after a second attack the eye became nearly blind. Following removal of diseased tonsils the man had gone on about five years without a further attack. Recently the vision was found to be about one-fourth of normal.

E. M. Marbourg, Colorado Springs, mentioned a case of chronic hemorrhagic glaucoma in which after repeated injections of salvarsan the eye cleared up, altho without vision.

E. R. Neeper, Colorado Springs, believed that the case should be gone into very thoroly. He suggested that atropin could be used in this eye. He would begin with homatropin and cocain, and see whether the eye would tolerate them. If the case was really one of glaucoma, the eye would probably quiet down following an iridectomy. The eye was certainly not hard at this time, and the pupil had probably become adherent while dilated during previous attacks.

F. E. Wallace, Pueblo. In these old blind eyes the first consideration is to save the other eye. There is danger later on of sympathetic ophthalmia. While it is well to look for a focal infection, I personally would remove the eye.

G. L. Strader, Cheyenne, Wyoming. We had a somewhat similar case a few months ago. Nothing we did had any effect, and in a few days the patient hardly had light perception. After removal of a tooth with an apical abscess, for two days he looked very much better. Then it took a grain of morphin to keep him in bed. X-ray of the sinuses was negative, but being suspicious of the appearance of the ethmoid cells we cleaned them out, and that night he had the first night's rest for two weeks. In a short time the vision was 20/30. We found no pus, but a large middle turbinate pressed on the septum.

J. A. Patterson, Colorado Springs. There is a hyperplastic ethmoiditis that does not have granulation tissue or pus, and from which you can have absorption just as you can have it from the pulp of a tooth.

Edward Jackson, Denver. I think three days' acquaintance with this eye would be a rather short time to condemn it, and that further attempts should be made to find the cause, but that unless decided improvement is brought about speedily the eye should be removed. I believe that the most important place now to look for a focal infection is inside the eye.

Old Right, Recent Left, Injury.

J. M. SHIELDS, for Melville Black, Denver, presented a man aged 53 years, whose right eye had been injured about thirty-three years previously while he was pounding on a hot metal plate, and whose left eye had been penetrated by a sliver of steel from a steel plate three years previously. It was probable that a metallic foreign body had penetrated the right eye, as evidenced by the closed pupil, the drawn iris with folds running with the radiating fibers, and the deep anterior chamber, suggesting that the lens had been absorbed. This eye had faulty projection. Following the injury to the left eye, there had probably been a corneal infection and a general uveitis, since the eye was still somewhat injected and blood vessels were present in a leucoma adherens which occupied the nasal half of the cornea. A fellow workman had

pulled the sliver of steel out of this eye. There were a number of new vessels in the iris of this eye, and the question was raised whether an iridectomy would be likely to succeed.

DISCUSSION.—Edward Jackson, Denver. An iridectomy on the left eye would not be a good thing to bet on, but it seems the only chance the man has. The outer part of the cornea seems to be in good condition, and the general nutrition of the eye good. The eye is not quite useless, but if there is a chance it should be taken.

C. E. Walker, Denver. I had a similar case in which it became necessary to operate. I took a knife a good deal like Dr. Jackson's cataract knife or the old Beers knife and passed it right thru the iris and the lens. Then I took a de Wecker scissors and made two very large snips of the iris and then left the eye alone. When the lens started to swell I made the usual incision and extracted the lens thru the coloboma made by the iridectomy. There is a great deal of astigmatism, but very fair vision. There was no trouble from hemorrhage of the iris.

W. H. Crisp, Denver, suggested that it was not altogether impossible to exclude capacity for vision in the right eye, as the poor visual projection might be due to the fact that the very minute pupil seemed to be occupied by a dense capsular membrane. Moreover, this eye was free from irritation. What could be considered in the way of an operation with the Ziegler knife on this eye?

Dr. Walker. If any operation could be done on the right eye, the Ziegler would be the ideal operation. Another thought, these men who work with steel are always getting fragments into the eye, and I make a regular practice of having an x-ray examination in these cases.

Dr. Jackson. I should not be inclined to work thru the small pupil, but to make two incisions into the iris. The probability is that back of the iris as well as in the pupil there is tough membrane that is adherent, and which would have to be divided. This right eye looks otherwise favorable.

F. R. Spencer, Boulder. Schnaudigel has advised a punch keratome which might be useful in a case like this.

Old Posterior Synechia and Lens Opacities.

J. M. SHIELDS presented for Melville Black, Denver, a woman of 20 years, who had had poor vision in each eye since a severe attack of inflammation at the age of 12 years. The vision of the right eye was 20/100, that of the left 20/70. Under atropin the pupillary margins were seen to be extensively adherent to the lens capsules. The use for a week of solid atropin and dionin daily had not caused any of the points of adhesion to break away. There was an opacity of each lens just posterior to the center of rotation, the opacity in the right lens being larger than that in the left. Should an iridectomy be done on each eye?

DISCUSSION.—F. R. Spencer, Boulder. The active influence of focal infection on these eyes may have passed, but at the same time the first thing to do is to look for such an infection. The next thing to do is to try an iridectomy. But it would not be wise to attempt surgical intervention before investigating the question of focal infection.

C. E. Walker, Denver. If the eyes are left in the present condition blindness will ensue. As the thing has gone on for a number of years not much is to be hoped for from such an investigation as Dr. Spencer suggests, but an iridectomy is urgently called for. Up to the age of 35 a needle operation can usually be done with good results.

Edward Jackson, Denver. I got two or three additional points of the girl's history. The inflammation happened when she was twelve years old after an attack of measles. The eruption did not come out well. Probably there was some sort of acute infection followed by the iritis. For some time the vision slowly improved, but for the last four years it has been stationary. With that stationary condition, and with the history of only one attack of iritis simultaneous in the two eyes, I think it is probably not a recurrent

iritis due to focal infection. Undoubtedly there is a little opacity of the lenses, which may increase as the patient gets older. In both eyes there is some space where the iris has retracted under the atropin. I think iridectomy is not urgent, and doubt whether optical iridectomy will give her better vision than 20/70. The pupils are rather large, there is probably some scar in the sphincter, and I should be disposed to try repeated instillations of eserine at long intervals, and not too strong. Atropin does not exert much pull on the adhesions, and the sphincter may be able to do something in the way of displacing them under the influence of alternate doses of eserine and atropin. Sometimes adhesions give way after a great many years.

J. A. Patterson, Colorado Springs. Where the pupil in such cases does not dilate, I find great advantage from the subconjunctival injection of dionin combined with atropin, holocain and cocaine.

W. H. Crisp, Denver, suggested that the so called measles of the patient's history might have been a syphilitic eruption.

J. A. McCaw, Denver. The age of incidence of congenital syphilis is between 5 and 15 years, and a Wassermann test should probably be made.

Penetrating Injury with Iron Staple.

D. A. STRICKLER, Denver, presented a man of 27 years who on the 8th of January had been struck in the right eye with an iron staple. When he was seen on January 15, there was a cut extending from the outer pupillary margin almost vertically to within 1 mm. of the limbus below. There was slight prolapse of the iris, and a horizontal cut in the iris extending outward 4 mm. The lens capsule was punctured to the temporal side, and swollen lens matter welled into the anterior chamber thru the tear in the iris. The temporal portion of the lens was cataractous, and there were striae in the nucleus.

DISCUSSION.—E. R. Neeper, Colorado Springs. The lens is undoubtedly go-

ing to break down, and is lost: and it should be removed.

J. A. Patterson, Colorado Springs. In a recent case of penetrating injury I at once made an iridectomy, and the vision was so fine that in a few days I did the same thing for a similar case. I believe that if you can you should do an iridectomy. You at once lessen the tendency to infection and give a chance for the wound to clear.

H. R. Stilwell, Denver, referred to a case in which the lens capsule had been ruptured by a nonpenetrating blow on the eye, and the lens substance had become entirely absorbed without surgical interference.

C. E. Walker, Denver. After injuries of this type in older patients, there is almost always a secondary glaucoma from swelling of the lens; and I believe the best permanent visual results in this class of cases are to be obtained from letting out the lens.

Thrombosis of Retinal Artery.

D. A. STRICKLER, Denver, presented a woman of 52 years whom he had seen in consultation with Dr. Swerdfeger. When first seen in the evening of January 9, she gave a history of complete blindness of the left eye, first noticed on waking that morning. On January 10, ophthalmoscopic examination showed the optic disc to be normal, that the veins were slightly large, somewhat tortuous, broken where crossed by the artery, with distal enlargement, and the arteries slightly diminished in size. The superior retinal artery showed as a white streak for some distance above the disc, no blood column being visible, and there was a small superficial hemorrhage two disc diameters above and slightly nasal from the optic disc. The left pupil did not react directly to light, but reacted consensually. On January 16, there was definite swelling of the nerve head, and a rectangular red spot in the macular region with small, less noticeable ones toward the disc. There was also a diffuse cloudiness of the retina. The urinary tests were those corresponding to chronic parenchymatous nephritis. Systolic blood pressure was 222 mm.,

and diastolic 150 mm. On January 12 the right eye was apparently normal, but more recently a small hemorrhage had been noticed about four disc diameters above the optic disc.

DISCUSSION.—F. R. Spencer, Boulder. The case was at first very suggestive of an embolism of the central artery in the left eye. We often have, however, in such cases a spasm of the artery, and under this condition an embolism will more readily occur. These disturbances may all be due to the arterial changes. I think the blood pressure should be lowered.

Edward Jackson, Denver. This case was likely one of arterial thrombosis. It was some hours coming on.

J. A. Patterson, Colorado Springs. I recently had a case of retinal detachment with extremely high blood pressure, albumin in the urine, and some slight heart lesion. I put her to bed for the detached retina, and it did not do that any good. I turned her over to a general man who gave her purgatives and plenty of water, and her improvement has been phenomenal. She got better in every way, and her albumin disappeared eventually. She was about 60 years of age.

Dr. Jackson. Clapp, of Baltimore, recently reported six cases of detachment of the retina in pregnancy which recovered, and there are a number of other cases scattered in the literature. Only a couple of days ago a man was in the office whom Stevens reported nearly twenty years ago, who was sufficiently frightened to reform his habits, and whose general condition is very much better. He would have unequal pupils, spasms of the arteries, and marked narrowing of the veins at the crossings, all of which symptoms are greatly improved.

Obstruction of Central Retinal Artery.

C. O. EIGLER, Denver, presented a man aged 42 years, a core maker by occupation, who on January 7 had had a sudden attack of complete blindness of the left eye. This lasted for twenty-four hours, after which he began to see shadows before the eye. The vision of

this eye had since improved to 5/100. The patient had complained for over two years of momentary blindness.

DISCUSSION.—Edward Jackson, Denver. The first time I saw this man at the clinic I thought the upper temporal artery was covered by opacity for quite a space, and there also seemed to be a stretch of bloodvessel that was filled with a white plug, no blood being visible. Then a few days ago there was some red where the white plug had been, and the part that seemed before to be covered up showed more blood thru it. The opacity extended from the upper temporal artery down toward the macula. It seems rather probable that the obstruction was an embolus, but it is to my mind very uncertain whether it was an embolus or a spasm. The history of previous attacks would suggest that it was a spasm.

C. E. Walker, Denver. I saw the case a few days after the accident, and found that the macula was white, there was one little red dot at the fovea, and the bloodvessels were blocked. I told him that it was due to constitutional trouble and that he should go at once to his doctor.

Obstinate Iritis with Synechia; Dental Causation.

C. E. WALKER, Denver, presented a man aged 39 years who had been for two or three months in the care of another surgeon on account of a persistent iritis. In spite of the use of atropin, the pupil had failed to remain dilated, the iris was beginning to come forward, the pupil was filled with a large amount of exudate, and there was almost no light perception. There was also a good deal of exudate on the posterior surface of the cornea. A more concentrated solution of atropin did not seem to produce any effect. Thoro examination of the nose and throat was negative. A dentist to whom Dr. Walker referred the case removed several teeth on account of root abscesses, and the eye promptly began to clear up and the pupil to dilate under an ordinary solution of atropin. At the time of reporting there were only

one or two adhesions below, and the vision had greatly improved.

Iridectomy for Glaucoma; Complications.

W. H. CRISP, Denver, presented a woman aged 33 years who had developed several complications following an iridectomy for glaucoma, but who was now apparently permanently cured. She was Italian by nationality, extremely emotional. The vision of the left eye had been completely lost from glaucoma during 1918. When the patient was first seen by Dr. Crisp in February, 1919, the vision of the right eye was 5/5 most, but the tension of this eye was 57 mm. of mercury, in spite of a miotic having been used that morning. The tension of the left eye was 69 mm., altho this eye was also under a miotic. The lowest tension obtained in each eye after two days' use of eserine was R. 37, L. 52 mm. of mercury. The right vision at this time was 5/4 partly, and the tension of the right eye varied during the next week between 37 and 40 mm. Iridectomy was done on each eye, and after removal of the dressing a moderate hemorrhage was found to have occurred into the vitreous a little behind the lens, almost completely cutting off the vision of the right eye. Almost five weeks after the operation the vision of this eye was 1/60, two weeks later 1/20, and rather more than two months after the operation 5/12 plus 1 with correction of 8 diopters of hyperopia. Soon after this, in the course of a week a cataract developed in the right eye, and the vision fell to 1/60, altho the tension was only 24 mm. Extraction was done, and two subsequent operations were necessary on account of a tough secondary membrane. All of these operations were extremely well tolerated by the right eye, which shortly before the date of report obtained vision of 5/4 part with correction. Entirely without medication, the tension of this eye had remained in the neighborhood of 20 mm. The left eye, from which the lens had also been removed, was retained, altho as a rather irritable eye the tension of

which was about the same as that of the right.

DISCUSSION.—C. E. Walker, Denver. In these cases it is desirable to operate early. In a great many of these subjects I believe the cause of the glaucoma is partial dislocation of the lens, which blocks the canal of Schlemm. I follow the custom advocated by Priestley Smith of Birmingham, of making a scleral puncture before doing the iridectomy, but at the same operation, so that the lens may be allowed to return to its proper position. If this is done systematically I believe we shall not get lenticular trouble following iridectomy, for one can make a broader iridectomy without damaging the ciliary body.

Posterior Polar Cataract.

W. C. BANE, Denver, presented a man aged 20 years, who had come complaining that for one week the central vision of the left eye had been defective. This he attributed to the glare of the sun on the ice while skating. He had been rejected for the army on account of poor vision. The vision of the right eye was 5/30, that of the left fair sized objects. The right visual field was normal, the left showed a central blind spot two inches in diameter at a distance of twelve inches. There was a posterior polar cataract in each eye, and floating opacities were seen in the left vitreous. The vision of the right eye was improved to 5/6 minus with minus sphere and cylinder, but the left vision was unimproved by lens, the opacity in this eye being larger and more central than that in the right.

Iridodonesis with Lens Opacities.

W. C. BANE, Denver, presented a man aged 62 years, who complained that following a fall downstairs in October, 1918, the vision of the left eye had been poor. There were some darting pains occasionally, but never any redness of the eye. There was a slight haze in the right lens, and a more dense opacity in the left lens. A distinct view of the fundus was not obtainable. The left iris was tremulous, and the

left lens moved slightly with movement of the eye. The vision of the right eye was 5/20, improved to 5/5 minus with lens. The vision of the left eye was of fair sized objects, not improved.

DISCUSSION.—C. E. Walker, Denver. These cases of tremulous lenses should be watched pretty closely. An immature cataract can be made mature and extracted, whereas a lens dislocated into the vitreous is hard to fish out.

Gonorrheal Ophthalmia; Extremely Rapid Cure.

G. L. STRADER, Cheyenne, Wyoming, reported a case of gonorrheal ophthalmia which had yielded with exceptional promptness to treatment. The man came into his office in the afternoon of January 14. There were large quantities of yellow pus, in which the gonococcus was found. The patient stated that the condition had only begun that morning. Eight per cent silver nitrat solution was applied to the inside of the lids, pulling the folds of the conjunctiva out with forceps, and then neutralizing with salt solution. The patient was sent to the hospital, and argyrol was used every two hours. The nurse subsequently reported that there had been no pus from two o'clock in the morning, and the patient was sent home in the morning of January 17 with only a slight redness of the conjunctiva.

WM. H. CRISP,
Secretary.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Continued from page 294

Cervical Sympathetic Injury.

DR. HUNTER SCARLETT, Philadelphia, read for himself and Dr. Stanley Cobb, Boston, the report of the 11 cases seen in U. S. A. General Hospital No. 11, in which soldiers had suffered various lesions of the brachial plexus, cervical sympathetic, spinal cord. Enophthalmos was present in all cases, and ptosis in all but one. Miosis was present in

all but one. But there was hypotension in only five. Heterochromia was not seen in any case and facial hemiatrophy in only one. All were capable of normal vision. They conclude that: "Low lesions effecting the brachial plexus thru which sympathetic fibres run cause the most severe and typical Claude Bernard-Horner syndrome. Lesions involving the cervical sympathetic nerves, with complete or partial interruption, produce symptoms less severe, as a rule, than root injuries. Contusions of the cord result in the least pronounced phenomena, and are more prone to complete recovery than the first two conditions. Heterochromia iridis did not in adults occur following injury to the cervical sympathetic nerve. The pupils of the cases with root and nerve injuries did not dilate with cocain; those of the cord contusions did dilate. The near point of the affected eye was less than its fellow eye in over 50 per cent of the cases, the average difference being slightly over 2 cm. It is difficult to draw any definite conclusion on this point, as the greatest variation was in a case of cord contusion, with only slight ocular symptoms."

DISCUSSION.—Dr. Edward Jackson, Denver, pointed out that this was the largest series of cases on record, excepting operative mutilations of the sympathetic or operations in glaucoma. The increase of accommodation on the affected side seemed a fact of great importance.

Dr. Joseph Lichtenberg, Kansas City, had seen one case of this kind but with complete blindness from optic atrophy.

Dr. George F. Suker, Chicago, stated that Horner's symptom complex frequently follows difficult forceps delivery being usually temporary.

Dr. Wiener, St. Louis, showed slides illustrating the difference between the two eyes.

Insufficiency of Convergence.

DR. J. M. Banister read the paper published in full on p. 269.

DISCUSSION.—Dr. E. C. Ellett, Memphis: Testing the ability of the muscles

to overcome prisms, base out, does not give much information, since this trick can be quickly learned, and the prism adduction doubled or trebled in one sitting. The test I use most is the simple one referred to of measuring the near point of convergence with any small object, such as a pencil. If this is at 8 cm. or less, equivalent to a convergence of at least 12 M. A., I have not considered the case as one of convergence insufficiency.

My experience is that careful refraction, good judgment in prescribing, and attention to such matters as the general health, illumination and relief of ocular diseases, especially conjunctival irritation, has given relief when it was obtained. When these measures failed, no amount of muscle exercise, prisms or operations have succeeded in a sufficient number of cases to encourage a further trial of them. I have seen a number of patients with this and other muscle troubles without any symptoms at all.

Dr. Walter B. Lancaster, Boston, Mass. If you want to test convergence, let the patient look at some object and watch him and see how near he can get. We can judge that by the way the eyes act as they converge. If there is a plain manifestation of effort we can discount a little, otherwise we can add a little. The writer said nothing about general treatment. Most of these cases are rather neurasthenic or below par, and that sort of treatment is important.

Dr. Meyer Wiener, St. Louis: To my mind the writer has left out the most prominent or dominant symptom which occurs in this condition, sleepiness on close use of the eye. We find this in students who are not able to study because they go to sleep, and this symptom disappears when they stop reading.

Dr. Patton: I had the pleasure of seeing Dr. Banister work, and wish to emphasize the things he said. We have all been proud of the result he has been able to get in this work of muscle study and improvement; and the results obtained from this treatment by operation, for the correction

of these symptoms, have been great.

Dr. H. B. Lemere, Omaha, Neb.: I felt like Dr. Ellett; that if you have corrected the refraction you have reached the limit, and have to rely on that alone to correct and get rid of symptoms. However, after seeing a few cases Dr. Banister operated on, and the wonderful results, I have become firmly convinced that is a pathologic entity and we ought to be able to tackle it when we find it and not pass it by.

Dr. H. Turner, Pittsburg: In our own practice it has been our custom to send patients first to a rhinologist for diagnosis of the condition of the accessory nasal sinuses, particularly the ethmoid sinus.

Dr. Luther Peter, Philadelphia: One of the practical methods I found in determining the convergence near point is the little electric lamp in the ophthalmoscope. You can determine the near point, and you can determine whether they can maintain the convergence for any length of time.

Dr. Banister, closing: I have in my time run up against very severe nervous conditions, owing to convergence insufficiency, and since 1898 have been using this method of operating on such cases, and I know I have gotten results in people who otherwise would have gone on to hopeless invalidism. Children not able to go to school, and after restoring their convergence they have been able to do good work in school. I believe in casting theory aside when we have practical illustrations and definite results in surgery. Sleepiness I did not mention, because we find that in all varieties of trouble in the eye. It is one of the first symptoms of commencing presbyopia.

Disturbances of the Heart and Liver by Low Grades of Astigmatism.

Dr. E. L. Jones, Cumberland, Md., stated that observations have been made on patients ranging from early childhood to almost senility, of the helpful or curative effect of exactly correcting astigmatism, alone or combined with other errors. This has been effective in the following conditions:

Vertigo; drawing of pain in the neck and shoulders, often extending the full length of the arm and hand; gassing stomachs; weakness of lower extremities, especially from the knees down; weak heart action or getting easily winded, when physical examination shows heart normal and persistently cold feet or extremities. These, with headaches, or sick headaches, are liver and heart symptoms; while nervousness, general depression of spirits and some other manifestations are sufficiently akin to hyper—and hypothyroidism and adrenalism, to suggest these states as the medium thru which symptoms are produced.

DISCUSSION.—Dr. Allen, Greenwood, Boston: In a previous paper of my own on "Ocular Vertigo" attention was called to the fact that vertigo was more commonly the result of errors of refraction than usually supposed, and it was particularly pointed out that the usual error in such cases was an astigmatism of moderate degree, with oblique axes, needing very careful fitting.

In the majority of these cases there were minor symptoms similar to those pointed out in Dr. Jones' paper, but they were so overshadowed by the primary symptom, which was in all cases cured or ameliorated by proper glasses, that no special mention was made of them. We are all indebted to Dr. Jones for pointing out the great necessity for a careful correcting of all astigmatic errors.

But I cannot agree with Dr. Jones' theory of the action of astigmatism on the liver, and the consequent causation of dizziness, nausea, vomiting and other symptoms of nerve exhaustion. The theory seems more likely, that dizziness and various nerve and stomach symptoms are the result of reflex nerve disturbances, produced directly from the nerves that control the eye muscles. I also would not ascribe the entire symptom complex directly to astigmatism, but would consider the eye strain as resulting from Nature's attempts to overcome defects but one of the contributing causes. In many cases it is perhaps the predominating cause, and

on its removal the patient is able to overcome other causes and proceed to a rapid recovery.

In view of the great number of people who have minor grades of astigmatism, and never have any symptoms, we must conclude that in cases where the eye strain precipitates trouble, the patient's body metabolism was in some way below normal; and that the relief of the eye strain is one of the measures for decreasing the overload which the body is trying to carry. The great lesson taught us by Dr. Jones is that heart and liver disturbances may be caused by the nerve overload, and may entirely disappear when all of the hidden astigmatism has been corrected and the proper axes found.

Dr. Lancaster: It is evident the idea that accommodation causes astigmatism is deep rooted. There is not time to go into that now, but would call Dr. Jones' attention to the method of getting the axis of astigmatism, and that is to use Dr. Green's astigmatic charts in the right way.

Dr. John Green, Jr., St. Louis: I have advocated their use on several occasions and wish to endorse what he says about securing the axis of astigmatism. It is astonishing how nearly accurately it can be done.

Dr. Lucien Howe: It occurred to me that when this is published there should be a protest from some member of the society as to the disturbance in the stomach, as directly related to some form of ametropia.

Another point is in regard to the position of the lens. I think that is too often overlooked. The position which is nothing more than the modification of Helmholtz and we should remember that a large percentage of cases do this thing, they tip them a little forward and a little out.

Dr. Spohn: To say a thing does not prove it. The essayist has a right to say a thing and anyone has a right to disprove the thing.

Dr. Jones. It is true that many cases of astigmatism do not present any symptoms. But when these symptoms do come they are probably the effect of the uncorrected astigmatism. Some

never have them until they have a serious sickness and then months after will say they never had their health since.

The Operative Treatment of Ptosis.

DR. WALTER LANCASTER, Boston, read a paper reviewing the classification of cases and the contraindications and indications for operation. He then reviewed the technic of the form of operation for ptosis, describing the anatomy and physiology of the parts and in detail three operations suited to different forms of ptosis.

DISCUSSION:—Dr. J. M. Wheeler, New York. There are so many different operations and the eye surgeon has so few opportunities, that he is not apt to get a large experience. We are indebted to Dr. Lancaster for placing a relative valuation on these things. In ptosis of not more than $\frac{3}{4}$ cm. the tarsus operation is satisfactory. The other operations are only partially satisfactory. As Dr. Lancaster said, the use of the frontalis is not entirely satisfactory, as the pull is not direct. The Hess operation is satisfactory; but the immediate effect is not the ultimate effect. There is a tendency for it to reduce as it goes on. It is possible and feasible to repeat the process if it becomes insufficient. This works very well.

His suggestion in regard to the use of fascia lata is good. In army repair work around the lids and face we became familiar with the use of the fascia lata. It is a satisfactory membrane to use, especially in the filling up of depressions. I have not used it in ptosis, but it would be warranted in young adults at least. Taking it is not quite as simple as he leads us to believe. In cutting down thru the skin it is easily found as a tense membrane, but the muscle tissue bulges in an alarming sort of way. After a strip is removed, one will wonder how to get the flaps together if he is not familiar with it. With chromicized catgut it is possible to get the fascia together.

Dr. Meyer Wiener, St. Louis: Let me make a suggestion which probably a great many are not familiar with. I find in suture operations on the lid

that a little pearl button, like a glove button, thru which to tie the stitches, is the best thing we can use. It is clean, easily secured, and the threads slide easily over the button.

Dr. Lancaster: Just a word of caution about the advancement of the levator; it is easy to overdo it.

A New Method of Advancement.

DR. MEYER WIENER, St. Louis, read a paper advocating a new method of Muscle Advancement, and reporting 11 cases in which it was done with gratifying result.

DISCUSSION.—Dr. Greenwood: I am able to get very good advancements without cutting any attachment but the conjunctiva. It is very simple and easily done. You have the conjunctiva cut with the muscle exposed, and a tuck in the muscle. At the top of the tuck, turn up the tendon and on each side fasten it down to the sclera; and you can lay the whole thing down and in three weeks the bunch is gone. At no time have you injured the middle fibres of the muscle, and these are brought forward close to the edge of the cornea and held down and I claim we have just as much advancement without cutting a bit of muscle or severing the muscle from the globe end without traumatism. I can do it in ten minutes. When you have it fastened with two sutures and tied tightly the muscle is not likely to pull out. There is no tension. Even should they do so you cannot lose anything. It is what I call combined tucking and advancement: and what is left of the bunch is very flat and soon disappears.

Dr. Hawley, of Chicago. I am glad to confirm Dr. Greenwood's method. At the Pittsburg meeting I described nearly the same thing. You can get almost any effect you want. I have done it with 45 deg. convergence or divergence. Make an incision over the tendon, you dissect back the conjunctiva as far as you want to go, holding it back with a modified lid retractor. You make a new attachment of the posterior part of the muscle to its tendon.

Dr. Ellett of Memphis: In regard to the use of the plate, for which I do not think Dr. Wiener claims originality, Dr. Savage has been using something of that sort for twenty years, where he uses the suture for muscle operations. It seems better to me to use the stump from which you cut the tendon, as in the Reese operation. You get a much more secure anchorage than with a suture which involves only the conjunctiva and episcleral tissues. It never seemed to me that it is good practice to tie a person's two eyes up for a week. It is not necessary.

Dr. Banister, of Omaha, called attention to the operation brought out by Dr. Valk of New York. Chromicized catgut should be used. Pass your needle down thru the incision to the episcleral tissue down to even the lower third, carry the needle around and over the muscle from below, and weave it in and out until you get the suture thoroly fixed so it cannot slip; and then take the other end and bring it down vertically thru the episcleral tissue to the attachment.

Dr. Wiener, closing: I have never seen a single case in which the stitches have pulled thru, but I have seen cases in which the conjunctiva stretched. In the early operations this was true because the stitches were not put close enough to the cornea. The similar plates of Savage were used for the muscle end and the severed end of the tendon; but not in the forward end where the muscle was to be attached, and that is the main issue in this operation.

Dr. Ellett said that theoretically it was right to make a weave, but practically it is difficult. But we do not weave in and out that muscle and tendon but once, and that is not difficult to do with a very small curved needle.

I have never found any serious objection to blindfolding a young person, and all these are done on young people. I do not think you can get the best effect without blindfolding them. Landolt always blindfolded his patients and kept both eyes shut a week. I do not keep them in bed, and they walk about

and talk to each other, and there is no serious objection as there would be in an old person.

As to not obtaining enough effect at the first operation. All you have to do is to pull on these threads and tighten them. The threads slip so easily. Even a slight overlapping will do no harm. It is startling how easily they will come forward. You have to use no effort whatever.

Simulated Brain Tumor.

DR. ROBERT SCOTT LAMB, Washington, D. C., reported a case in which the presence of choked discs, headaches, projectile vomiting, etc., indicated brain tumor probably involving the pituitary body, but without hemianopsia. Six weeks of organotherapy, luetin 2 grains, and posterior pituitary 1/10 gr. restored her to approximately normal condition which continued after more than four years.

Cyclodialysis.

DR. HARRY S. GRADLE, Chicago, read the paper published in this JOURNAL, v. 3, p. 41.

DISCUSSION.—Dr. Jos. Lichtenberg, Kansas City: The experience that I have had with this operation is so limited that I cannot speak authoritatively. I did the first one a year or two after Heine's article appeared. The result was not favorable and deterred me from using it in other cases. While in the Elschmig clinic in 1911, I performed a second operation with good results; and since then two others in which the results were only fair. Undoubtedly our cases were not chosen properly, according to the conditions outlined in Dr. Gradle's paper.

A possible indication for this operation, not mentioned in the paper, is where the anterior chamber is so nearly obliterated by the pushing forward of the lens and iris that iridectomy would be practically impossible. Here cyclodialysis could be employed to give ease or as a preparatory operation for a more radical one of iridectomy, corneoscleral trephining, etc.

It will be noticed, looking over the bibliography, that nothing has been written on the subject since 1915.

Possibly the war activities have had something to do with this, or possibly the operation is not being used as much as formerly, or after years of trial, judging from the indications for the operation as outlined, the cases for it fall within a limited field.

An Operative Procedure for Keratoconus with Report of Three Cases.

Dr. Green, San Francisco, California, read a paper on this subject. In the treatment of conical cornea the most successful procedures are those that reduce intraocular tension. In accordance with this view the writers reduce lid pressure by an external canthotomy and lower the intraocular tension by doing a modified Lagrange operation.

Of three cases operated upon by this method, vision in one case was 4/60 before operation and 4/10 after operation. In another case vision before operation was 1/30 and 4/12 after operation, and in the third case vision before operation was 4/30 and 4/15 after operation. (See p. 429)

DISCUSSION.—Dr. Banister, Omaha: I would like to ask why the Elliot operation, pure and simple, would not be sufficient. That is an ideal operation, and it seems in the modification there is more traumatism than in simply turning the anterior flap back and going in at the corneo-scleral junction.

Dr. Wiener: It is hard for me to accept the fact that the patient has only 1 D. in one meridian, and 5 D. in the other meridian in advanced keratoconus. I have never seen a case but needed a very high minus glass, and with a high astigmatism. I am not questioning the statement; but cannot reconcile it with my experience. One statement is that this method is the safest. It may be the easiest, but I claim my method is the safest, because I do not open the anterior chamber and subject the interior of the eye to risk or infection. It is, I think, a more difficult operation, but could be eas-

ily performed by any one with practice and experience. The result does not depend upon the reduction of tension at all, but on reduction of curvature. This may have to do with the results obtained by Dr. Green. He takes out a portion of the sclera at the upper border of the cornea which tends to pull the cornea flatter.

Dr. Blaauw. I think internal canthotomy should be done more than it is. What strikes me about keratoconus is that it is a self-limiting disease. You do not know when it is going to stop in its evolution; and I find it hard to make up my mind when to operate and when not.

Dr. Hawley of Chicago: I simply want to mention one case of conical cornea that is all hyperopic. I presume it was a case of high hyperopia and the change still left enough for a plus cylinder.

Dr. Green, closing: We use this to the exclusion of the Elliot or Lagrange for glaucoma operations. It is safer than the Lagrange because the eye is better protected; and than the Elliot, because with a trephine you are cutting down on the ciliary body without knowing how far you are going. If not, you are apt not to get the drainage. Five years ago we did nothing but the Elliot. But we now get better results with less reaction and we are much more certain of what we are going to get. Weeks has taken up the Lagrange operation to the exclusion of the Elliot.

Dr. Wiener was surprised at the amount of astigmatism of a hyperopic type. I was surprised myself. The patient came with astigmatism, with the hyperopia predominating. Dr. Wiener contends that his operation is safer, but his theory does not agree with ours. He would increase the intraocular tension by making the eyeball smaller, while our process is entirely opposite, to reduce the tension and cause the thin portion of the cornea to regenerate if possible.

ABSTRACTS

M. Straub. Ocular Inflammations, Caused by Resorption of Lenticular Substances in the Ocular Lymph. Illustrated with 56 photographs of sections. A posthumous work of Prof. M. Straub. Edited by his assistants "as a token of gratitude toward their teacher."

Prof. Straub had intended this work to be part of a larger one, which would include a chapter on glaucoma. His early death prevented its completion.

For years he possessed sections of eyes, which had suffered from inflammation, the result of resorption of lens substance thru an opening in the capsule or some other way. Such eyes seemed rare, but helped to explain a much larger number of conditions than was at first supposed.

Knowledge of the bacterial world led physicians to consider every inflammation of importance as due to living organisms. Only in later years the view revives that practically important inflammations can originate without infection. Straub would demonstrate that the inflammations caused by lens substance are not merely hypothetical. Ophthalmologists know well the injurious influence of absorbed soluble lens substance, as shown after cataract extraction, in traumatic cataract, after spontaneous resorption of a senile cataract, and after dislocation of the lens.

The work is divided in three chapters: phacogenetic inflammations after extraction and traumatism, after dislocation of the lens, and after spontaneous resorption of a senile cataract.

If observation has demonstrated that large quantities of lens substance can produce chronic and even acute inflammations, then we may surmise that very small quantities, absorbed during a long time, can exercise a slight but continuous irritation. This can lead to accept a phacogenetic origin of glaucoma.

The first observation was in a 50 year old man, who had a zonular cataract; which was operated on without iridectomy, while much clear cortex re-

mained behind. There was much post-operative irritation, which necessitated two punctures to remove the swollen cortical mass. The eye was quiet two months later, V. = $\frac{1}{3}$. The second eye was operated on a few days later. As much cortex remained behind, but hardly any reaction occurred. Did the lens substance absorbed in the first eye produce an immunity for the second?

Some months later a lady, 56 years old, with ripe cataracts, brown nuclei covered with a thin layer of grey, probably shrunken cortex, underwent a preliminary iridectomy in both eyes. L. healed normally. R. had a long, very painful reaction. Here the lens capsule had been wounded. After failure of the commonly used means, injection subcutaneously in the arm, of a suspension in Na. Cl solution of pig lens changed the condition after 4 days. The eye became gradually quiet. This does not prove that the favorable turn must have been caused by the injection of the lens substance. It may be that accidentally the capsule had closed with halting of the inflammation. If the pig lens had an influence the suppression of the reaction thru the formation of the immunity must have caused closure of the wound of the capsule. Removal of the lens would also have stopped the inflammation.

Not only the senile cataractous lens but also the normal senile lens can produce such an inflammation. A man 72 years old, was operated on by iridectomy for glaucoma simplex. He returned after 5 months with the eye sensitive since some weeks, redness, vesicles in the corneal epithelium, spots on Descemet's membrane, vessels in the iris, posterior synechiae. Treatment was without success. The eye had to be enucleated. A small tear in the capsule of the lens was found, with the route of the knife in the lens substance; from which wound traumatic cataract had formed. Infection can be eliminated on account of the time, and on general microscopic grounds.

The diagnosis could have been made, if the growth of the cataract had been followed, with the decrease in the depth in the anterior chamber. The extent of the fibrinous precipitates at the back of the cornea are surprising; and also the vesicle formation in the epithelium of the cornea, which is rare in the usual cases of iridocyclitis.

The name iridocyclitis for this process is wrong. The marked infiltration with leucocytes in the iris is distinctly secondary. The solution of lens substance was absorbed by the iris, and this produced the infiltration. The ciliary body furnished the exudation cells, which moved from it to the places of strongest concentration of the lenticular poison. We are dealing with an endophthemia from a chemical cause. The toxins came from the wounded lens. The disease could be named *Endophthemia Phakogenetica*.

A tear in the anterior lens capsule can give symptoms of cyclitis, and of the posterior capsule those of hyalitis, not very pronounced, as the fibrinous exudation in the anterior chamber, and the corneal edema, which we find usually with hyalitis are absent. High tension, however, is present.

Spontaneous tear of the lens capsule can occur and produce an endophthemia phakogenetica. Recognition of this condition will save the eye thru extraction of the lens. We find exacerbations and remissions in the course of the inflammation, which does not yield to the usual remedies, the cornea is very opaque and specially large precipitates are present on Descemet's membrane; the corneal limbus is much swollen thru infiltration. Tear in the capsule is not so rare without known trauma. It is not improbable that the capsule of a cataractous lens is less resistant.

We have seen that in old people the lens substance, in soluble form in the ocular lymph, can form a poison for the eye, the cataractous lens as well as the normal, which thru a tear in the capsule has become opaque. This poison produces inflammation, the intensity of which depends on the quantity, which is absorbed. After extraction and dis-

section of secondary cataract usually the small quantities do not produce important reactions. If, however, the entire lens is still in the eye, and large masses of lens substance are dissolved in the lymph thru damage to the lens capsule, inflammations of a dangerous nature arise.

When the tear arises in the anterior capsule the inflammation becomes localised chiefly in the anterior part of the eye, and there is danger that one will be satisfied with the diagnosis iridocyclitis. A tear in the posterior lens capsule produces exudates in the posterior part of the eye, which favor the diagnosis hyalitis and is only distinguishable from hyalitis thru the slight reaction of the induced inflammation in the anterior part of the eye.

Blind, enucleated eyes, which had become painful after a long period of rest, will show that the continuous degeneration has made the capsule permeable, and the absorbed lens substance has become the cause of the irritative phenomena. This ought to be inquired into.

Resorption lymphocytosis arises when milder irritative toxins are absorbed in the ocular tissues. The lymphocytes are found especially before the posterior layers of the iris; and also in the anterior layers, when the process has lasted a long time. They are also found in the ciliary body in a small triangle near the anterior border of the ciliary muscle around the vessels; and also in the choroid at the ora serrata. In the other parts of the choroid are found, here and there, small foci of infiltration, as observed in sympathetic ophthalmia. Infiltrations were found around the vessels of the retina and optic nerve, and around the perforating vessels of the sclera, leading toward the limbus, and also in the loose tissue of the limbus itself.

These infiltrations demonstrate that the products of tissue resorption have concentrated at these places and have attracted leucocytes. The origin is found in the lens, which has reached the age, at which it can give off toxic material and which is partly dissolved. Nobody doubts that the dissolved sub-

stance can pass the intact lens capsule. What clinically was called phthisis bulbi dolorosa may be thus explained. The pains should then be relieved by removal of the lens. The condition of the retina is such that perhaps the eye would retain some function.

Straub found that Fritz Ask had recognized the phlogogenetic influence of the luxated lens. It is well known that the luxated lens can be tolerated in the vitreous in some old people. However, in the plurality of the cases the eyes with luxated lens show signs of inflammation, sometimes localised near the lens, sometimes at greater distances. Ask finds that the inflammatory signs are much more pronounced when the capsule is torn.

Some cases of resorption of a senile cataract occur without disturbance. Mostly, however, accidents follow, or a severe inflammation or glaucoma. Straub had occasion to examine three such eyes. The diagnose of resorption of the lens was not made in vivo. Microscopic examination made it clear that the sensitiveness of the phthisic eye was caused by absorption of lens substance in the ocular lymph. One case showed also atrophy of the iris, which Straub considers was caused by the lens resorption.

Straub sums up thus, after a general survey of the localisation of exudate cells in inflamed eyes: When in an eye weak toxins are gradually absorbed, there appear in definite parts of the eye, infiltrations with mononuclears, usually called plasma cells. In the choroid an infiltration occurs in the region of the ora serrata; in the ciliary body at the anterior surface of the ciliary muscles; and around the retinal veins. The largest part of the choroid remains free.

This resumé cannot do justice to Straub. The entire article is written in his usual clear style, and is full of important deductions and pathologic microscopic observations. We deplore once more the untimely death of this lucid observer, which deprives us of a most instructive chapter of the causa-

tion of glaucoma thru absorption of lens substance in the eye.

E. E. B.

Guglianetti, Luigi. Action of Bacterial Toxins on Cicatrization of Wounds of the Eye. *Archivio di Ottalmologia*, Sept.-Oct., 1919, v. 26, p. 181.

The author, in an extensive work, attempted to reproduce experimentally the conditions in which a wounded eye is exposed to bacterial toxins, both when these are absorbed from foci elsewhere in the system, and when their action is local. He reviews the work of Tornatola on wounds of the eye, and of Del Conto, Lettieri and others on wounds of other regions, when exposed to toxins.

The author practiced on rabbits three kinds of aseptic wounds: corneoscleral trephining, iridectomy, and the Saemisch corneal incision. Toxins were given in one series, systemically by the subcutaneous and intraperitoneal routes, for some days before and after the wound was made. In another series the toxins were instilled in the conjunctival sac or injected subconjunctivally. Eyes were enucleated 2, 4, 7 and 16 days after the wound, and the progress of repair determined in sections. Controls were made by inflicting the same wound on the other eye at a different time, and sectioning it after the same interval. Fourteen experiments with diphtheria toxin were made, 8 with a toxin from *B. typhosus*, and 7 with the toxin of virulent streptococci.

RESULTS.—In the cases where toxin was given systemically, the eyes showed no greater local reaction than the control eyes. In the most severely intoxicated animals, a slightly retarded cicatrization was observed, which the author attributes to the general trophic changes produced by any such debilitating condition. It was most marked with diphtheria toxin.

Where toxins were given locally, extensive changes were seen, especially with diphtheria toxin. Violent conjunctivitis, keratitis, and iritis occurred, with necrosis of the conjunc-

tiva and of the cornea near the wound. Repair, when it finally began, was slow and irregular. With the typhoid and streptococcus toxins, reaction was much less marked, but there was definite inflammation and retarded cicatrization.

S. R. GIFFORD.

Marin Amat. The Marcus Gunn Syndrome or Phenomenon. *Ann d'Ocul.*, 1919, v. 156, p. 513.

The author reports a case of associated movements of the upper lid and the jaw, the first he had seen, and illustrates his text with three photographs showing this association. The patient, female, age 18, for the first few days after birth was unable to open the right eye, and also presented a capillary angioma on the right jaw. These were attributed by the attending physician to birth injury. The condition remained the same for two years, and only at the first attempts at mastication was a movement of the lids noticed, there being an exaggeration of the normal action of the levator. There has been no change up to the present time. There is a ptosis of the right upper lid which persists except when the patient talks, masticates or opens her mouth widely. The case differs from the most of the cases published in ptosis, and in a paralysis of the superior rectus. The author refers to his case, previously published, of an "inverse Gunn syndrome," i. e. voluntary closing of the eye causing an involuntary opening of the mouth. Amat concludes that the superior branch of the motor oculi contains fibers derived from motor part of the trifacial, or the nerve of mastication. In certain animals this synergism is necessary, but even when these fibers are rudimen-

tary, as in man, they may develop when necessary, as in a case of ptosis, and perform a supplementary rather than a synergetic function. The anastomosis between the third nerve and the nerve of mastication is a peripheral one. We know that the motor oculi frequently receives, in the orbit, a branch from the ophthalmic nerve or its nasal branches. Altho these probably contain no motor branches, it proves the possibility of other anastomosis, i. e., with the trifacial.

By this theory, he explains the cases without ptosis, or where the latter occurs, wherever its origin. Cure is often obtained by perfecting isolated movements of the lids, the latter finally obeying the will, and freeing itself from the association which binds it to the movements of mastication.

C. L.

Kalt, Restoration of Lid by Means of Flap with a Double Surface. *Ann. d'Ocul.*, 1919, v. 156, p. 571.

The author describes this procedure in the case of a soldier who had lost the entire upper lid and eyeball. A rectangular flap was outlined on the forehead by two vertical parallel incisions; and a dissection was made in the form of a bridge. The flap was replaced for one day to permit hemostasis. Then a large deltoid epidermal graft was placed beneath this, the lower face upward, and the lips of the two incisions incompletely sutured, and left for twelve days. Then the flap was severed by a superior horizontal incision, and the usual Indian autoplasmic operation performed. The result was very satisfactory—a thick lid with double epidermic surface.

C. L.

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REPORTS OF RARE PATHOLOGIC CONDITIONS

The value of careful reports of rare pathologic conditions may be in either of two directions. It is always worth while to extend the boundaries of scientific knowledge, for we can never know when an isolated observation upon a rare condition may throw light on problems of great practical importance. Scientific knowledge is like a dissected map, in which a number of pieces may be examined without showing any relation to each other; but when a certain connecting piece is found it shows the proper relations of all the others. So the discovery of some new fact in pathology, trifling and unimportant in itself, may give significance to observations that before had no practical importance.

It is also important, from the practical side, to have exact and complete accounts of every rare condition, simply because it is rare. The individual oculist may not meet with more than one or two cases of a certain kind in a life time practice. When he does meet such a case he will be unable to

advise his patient, unless he has already become acquainted with the condition through the literature. But if he has it in mind, from reading a good description of it, or knows where such a condition would be described by those who have encountered it, he can quickly find out the significance of what he has observed, and advise his patient intelligently.

The importance of such reports is illustrated by the cases of iris cyst mentioned elsewhere in this number. A young oculist recognized the resemblance to sarcoma, and called a colleague in consultation. He agreed that the appearances must mean sarcoma, threatening the vision and life of the patient. A most experienced consultant saw the case, and could not suggest any more probable diagnosis. But both eyes seemed equally involved. One could not urge the enucleation of two seeing eyes, and a tentative iridectomy, in hope of removing the growth from one eye and deciding its character, was rejected by the patient. Four years observation of the case, brought the conviction that the condition was not sarcomatous but cystic.

This case was reported, but it did not get wide enough circulation. Fifteen years later one of the most competent ophthalmologists in the North of England encountered a similar case. He made the diagnosis of sarcoma of the iris, and called in consultation one of his best informed colleagues of London, who concurred in the diagnosis. Only one eye was affected and next day it was enucleated. The microscope showed the condition to be that of simple nontraumatic cyst; and relatively harmless. If the English ophthalmologists had read the report of the American case, it might have raised a doubt of which their patient would have had the benefit.

There are many conditions so rare that not one ophthalmologist in a thousand will meet them until some patient comes to him with something of the kind, trusting to his competence to give the best advice possible. Then, if the condition has been well described in the literature, and the man who announces himself as a specialist in eye diseases, is properly acquainted with that literature, so that he can hunt out and study the best description of this and allied conditions, the patient will get the benefit of the experience of the whole profession with reference to his malady.

That is the justification for the reports of the rarest cases, that may occur in the practice of anyone. Such reports should dwell on the clinical aspects, the appearances and course of the case, with minuteness of detail that will serve the whole profession in lieu of particular clinical experiences.

E. J.

THE NEW ORLEANS MEETING

The scientific proceedings of the Section on Ophthalmology of the American Medical Association will be published in its transactions and in the Journal of the A. M. A., and elsewhere. But certain occurrences connected with its meetings, and not included in those proceedings, are of sufficient interest to mention here.

The number of members registered in

the section was nearly 300, a larger number of ophthalmologists than ever attended an international ophthalmological congress except one. But this attendance has been exceeded in previous years; just as the general attendance on the A. M. A. has been larger in cities more favorably situated than New Orleans. Doubtless there will be a larger attendance next year at Boston. For this section is, from year to year the largest body of men interested in ophthalmic science that assembles anywhere in the world.

A pleasing incident of the meeting occurred when Dr. Parker of Detroit took the platform, while his friend, Dr. Ellett of Memphis, diplomatically got Dr. de Schweinitz of Philadelphia out of the room. Then Parker told the Section that there was mention of de Schweinitz for the Presidency of the A. M. A.; and that the election would occur next day. It was eminently proper that the members of the Section who would best know the abilities of their colleague, and the efficiency and grace he would bring to the office; and his eloquence and good judgment as a public speaker, should speak to delegates from their respective states of these matters.

In view of the fact that of late years no one has been elected to this office who has not been a leading candidate the year before, it was not unsatisfactory to learn next day that the vote stood, Work, 68, de Schweinitz 50. It might be unfortunate to have the A. M. A. split by rivalry among the Sections for its chief offices; but it would be quite as bad to establish a custom of confining these offices to the heads of the Public Services, and the men active in two or three sections. The good of the Association requires that the ophthalmologists present their proper claims.

An incident of different character occurred when Dr. Howe called attention to the utterly deplorable state of members of our profession in Vienna, as shown by letters from Professor Dimmer, and revealed thru other channels. Dr. Howe offered to transmit to Prof. Dimmer any relief funds that

might be placed in his hands; and a subscription paper drawn up and circulated soon bore the names of 35 or 40 prominent members of the Section. Such subscriptions may still be sent to Dr. Howe at 520 Delaware Avenue, Buffalo, N. Y. The sum raised will be sent as certificates by means of which the holders can draw on the food supplies established by America in Vienna, for the relief of the starving victims of military ambition and national folly.

The officers for the Section chosen for the coming year are: Chairman, James Bordley of Baltimore; Vice-chairman, Marcus Feingold, New Orleans; Secretary, George S. Derby, of Boston; Member of the House of Delegates, Lee M. Francis of Buffalo.

Dr. Hiram Woods, being ineligible for a third successive term, Dr. Albert E. Bulson, Jr. of Fort Wayne, Indiana, was chosen to represent the Section on the American Board for Ophthalmic Examinations. E. J.

A NEW JOURNAL

The field of physiologic optics furnishes a large part of the basis for the practical work of the ophthalmologist, and has large interest for the physicist, the physiologist, the optometrist, and the manufacturing optician. In the wide domain of ophthalmology it offers the best opportunity for specialization in journalism. There are many questions that interest different groups of workers, the discussions of which by members of different groups from different viewpoints must be of great advantage. The appearance of a new journal devoted to this especial field is therefore to be welcomed.

The new venture, called "AMERICAN JOURNAL OF PHYSIOLOGICAL OPTICS," is edited by Charles Sheard, A. M., Ph. D., and published by the Research Division of the American Optical Company. The first number bears the date, January, 1920, altho considerably delayed in its appearance. It is to be issued quarterly. It is well printed on good paper, with clear, pertinent illustrations. We congratulate its sponsors on such an auspicious beginning.

By the contents of the first number we cannot judge its ultimate value to science. But we can see the direction in which it starts out; and if it holds to this course and receives the proper support, it will be both creditable to American Science, and useful to all who make ophthalmology their professional work.

After a couple of editorials setting forth the purpose of the publication, comes a historical paper on "Thomas Young, the Father of Physiological Optics," by the Editor. Next we have "Eyestrain in Relation to Occupations," by George M. Gould. "A Comparison of Photoelectric Cells and the Eye," W. W. Coblentz; and "The Value and Limitations of Perimetric Methods of Study," by Luther C. Peter, complete the department of original papers.

Under Abstracts and Reviews are given two excellent condensations of papers published in this Journal by Dr. Howard on "A Test for the Judgment of Distance," and by Dr. Lloyd Mills on "The Effects of Faulty Craniospinal Form and Alignment Upon the Eyes." We shall be glad to reciprocate by presenting in abstract some of its original papers; and welcome this Journal as a collaborator in its chosen field of usefulness. E. J.

BOOK NOTICES

Syphilis und Auge. (Syphilis and the Eye) von Prof. Dr. Josef Igersheimer, Goettingen. 8vo. 625 pages. 150 illustration, some in colors. Berlin, Julius Springer, 1918.

Few of the books of recent years possess such eminently scientific and practical value to the ophthalmologist; and, resulting therefrom, such importance to his patients as Syphilis and the Eye by Igersheimer. Too often has the specialist been taunted with the frequently only too well merited reproach, that his syphilitic patients are not thoroly treated. This and the tremendous changes of the last ten or fifteen years in our views of syphilis, and in the principles guiding its treatment, prevention, diagnosis and prog-

nosis, make revision of the whole question, in all its aspects, of great import to the physician already in practice. The book before us answers the purpose admirably.

Tho reflecting thruout the literature of its subject, it does not contain a dry and disjointed enumeration of quotations; but bears the individual stamp of the author who on almost every phase of the subject has the right of his own opinion based on clinical and laboratory experience. A more thoro cross-index and an English translation would greatly increase its field of practical influence; tho the research worker will be somewhat hampered by the fact that the non-German literature has been worked into the book less than might seem desirable. An edition condensed to about one-tenth of its present volume, prepared by the author himself or under his supervision, would contain all the essential data and would make them at once available to the general reader.

Over 100 pages are given over to a general discussion of syphilis. The pathology of syphilitic infection, the rôle of the treponema and a review of experimental syphilis open the chapter. The diagnostic and prognostic values of the Wassermann reaction, of the different tests on the spinal fluid; of the luetin reaction, of animal inoculation and of serologic family study are analyzed. Hereditary syphilis, in all its aspects, the prophylaxis and the evaluation of the different modes of treatment close this general part.

The greater part of the book is naturally devoted to a systematic discussion of the syphilitic manifestations in the different parts of the eye. From the abundance of important statements only one here and there can be gleaned for the space allotted to this review. A critical study of experimental eye syphilis in animals leads the author to the conclusion that the disease in animals is different from that in man owing to the mode of infection (large quantity of infecting material introduced into the animal), and to the different reactions of the animal and

human organisms; because of the adaptation of the treponema to the human host, acquired during many centuries. In spite of this, valuable data have resulted from animal inoculation regarding parenchymatous keratitis, iritis, choroiditis and optic nerve atrophy.

In the chapter of lid and conjunctival affections the fact is emphasized that it is often impossible to decide whether a given lesion is of secondary or tertiary character. Existing eye affections predispose to a primary lesion on the eye. The various manifestations are discussed and valuable hints given as to diagnosis and treatment. When dealing with dacryocystitis the possibility of a syphilitic etiology is always to be considered, both in the young and in the adult.

Parenchymatous keratitis occupies about 80 pages and here features of the disease are discussed that are hardly ever found in textbooks. Keratitis parenchymatosa is almost purely an effect of the treponema in the fetus and in the new born; in later life a specific altered reaction of the cornea predominates more and more in the production of the clinical picture. The author is inclined to doubt a tuberculous etiology of the keratitis, a positive Wassermann having been found in nearly all the cases. While the keratitis is rather little influenced by the antisiphilitic treatment, we are reminded that treatment must not consider the corneal affection only; but it must above all be directed against the underlying general condition.

Iris and ciliary body are equally well handled. Luetic iritis is said to relapse only rarely. Almost all eyes with syphilitic retinitis have had an iritis. Choroid and retina are treated in the same chapter because of the difficulty, even anatomically, to decide which was primarily affected; an isolated affection of the choroid can occur tho, and primary affection of the retina exists. The various forms of affection due to acquired and congenital syphilis are described. The appearance of the salt and pepper fundus is clearly explained by its histology. Vascular affections

of all kinds are typical of syphilis. Proliferating retinitis is less frequent than in tuberculosis because of the relative rarity of hemorrhage in syphilis. The question of an etiologic relation of syphilis to glaucoma will only be solved by systematic examinations.

Ocular neurosyphilis is dealt with in a chapter of 220 pages of which a great deal of space is devoted to syphilis of the central nervous system, its pathology, diagnostic, prognostic and therapeutic features. Tabes and progressive paralysis get full consideration. This is followed by a systematic survey of optic nerve affections, i. e. neuritis, choked disc, atrophy. The newer method of field examination in which the test object is carried perpendicularly to the direction of the nerve fibers in the retina gives earlier and more valuable information than the older way. In true optic neuritis a disturbance of adaptation may be found, not in pure choked disc.

Pupillary disturbances receive special consideration. Motor nerve affections are shown in their relation to cerebral lues, tabes and congenital disease. Trifacial affections and nystagmus conclude this chapter which, because of the many fine points raised and the many case histories illustrating them, makes every attempt at review appear hopeless. One leading thread runs thru the whole: the use of all diagnostic means as the only hope for successful treatment, which is to arrest destruction of valuable nerve tissue and to cure the underlying general cause. A chapter on orbital affections and one on syphilis and blindness close the book. Mention should be made of the 150 excellent illustrations in the text of which many are printed in colors, a style more extensively used of late, and worthy of wider imitation.

M. FEINGOLD.

The American Encyclopedia and Dictionary of Ophthalmology. Edited by Col. Casey A. Wood, M. R. C., U. S. A., M. D., D. C. L. Assisted by a large staff of collaborators. Vol. XVI, pp. 12,009 to 12,800. Fully illustrated. Chicago, Cleveland Press.

This volume carries the work from Solution, Dobell's to Toxic Amblyopia: and makes it probable that two more volumes will complete it. Probably the most important article in this volume is the one on Sympathetic Ophthalmia, 48 pages, by Dr. Harold Gifford, of Omaha, to which is appended a bibliography of 15 pages prepared by Dr. Frank Stockman of the Library of the Surgeon General, Washington, D. C. Dr. Gifford has dealt with the subject from all points of view, and has produced a monograph that is especially practical, yet brings to its support the latest findings of scientific investigation and discussion. There are extensive footnotes, which with the bibliography are in fine print, making this the largest complete article in the volume. The section on the Stereoscope, by D. W. Wells of Boston, occupies 68 pages, but is freely illustrated; and the section on Toxic Amblyopia, altho occupying 81 pages is not completed in this volume.

Next in length to the above is the section on Syphilis of the Eye by John A. McCaw of Denver.* It fills 36 pages, and is illustrated by the color plate taken from the January number of this Journal. It must be regarded as supplementing, and supplemented by, the 19 other sections of the Encyclopedia, to which it refers, and which deal with particular parts of this general subject.

It seems proper at this time again to notice the enormous amount of work that its Editor is putting on the Encyclopedia, and the large share his work has, in making this the most valuable reference book on Ophthalmology that has been printed. The important brief notices, one line to ten pages, that come from his pen to make up the body of the work are innumerable; at least we believe no one has yet tried to count them. But in this volume alone there are eight articles varying in length from 11 to 33 pages, that, being unsigned, must be credited to him. Let us see what are these "unconsidered trifles" that he has snapped up.

The longest, 33 pages, is on "Teaching Methods in Ophthalmology." It gives not only a full history of recent

movements regarding medical degrees in ophthalmology, but also takes up the methods and machinery of ophthalmic pedagogy. Next comes "Speculum," 29 pages, fully illustrated. Then there are 20 pages devoted to "Sport, Ocular Problems in," that will enable the careful reader to give assistance to some of his best patients, in matters of which they can scarcely get an understanding except from the qualified expert. Under "Strabismus," 19 pages are given, bringing up to date the subjects of "Ocular Muscles" and others dealt with in earlier volumes; "Test Charts," 15 pages, "Sporotrichosis of the Eye," 13 pages, misplaced after sport, "Tabes Dorsalis," 12 pages, and "Tonometry," 11 pages, complete this list.

We may mention also an 8 page account of "Syndromes," that will often prove convenient. Most syndromes are named for their supposed discoverers; and it is hard to remember their significance and often very difficult to find any account of them in text books. As one uses the Encyclopedia he finds himself turning more and more frequently to it, to settle doubtful points and clear up his indefinite impressions. The great advantage of having information brought under one definite arrangement becomes manifest as this work approaches completion.

E. J.

Transactions of the American Academy of Ophthalmology and Otolaryngology. Clarence Loeb, Editor, 1919.

Of the eighteen ophthalmologic articles, four titles deal directly with war service and of the balance most refer to experiences therein. Of the thirteen otolaryngologic articles a number likewise show evidence of Military Service. Therefore our Association was not only largely represented in the Army but likewise the members were interested in scientific work.

Of special importance in these proceedings are the articles by John Wheeler, "Free Dermic Grafts for the Correction of Cicatricial Ectropion," that by S. Hanford McKee on "Epith-

elial Inlay and Outlay in Lid Repair" and that of Joseph C. Beck on "Plastic Surgery," all of which show results of Army experience. The "Operative Treatment of Ptosis" by Walter B. Lancaster is a classic. Several new or nearly new operations for "Muscle Advancement" are described by Meyer Wiener and an "Operation for Keratoconus" by A. S. and L. D. Green. A number of new procedures are described in the ear and throat section.

Alphabetical directories of names and addresses by states are given. These are presumably correct, but some Army titles are incorrect. There are some misspelled names and ancient addresses. A really up-to-date and correct list is a difficult feat only to accomplish and probably impossible by the busy editor of our transactions.

Quite a number of these papers should be republished in Journal form for it is the lot of Transactions in book form to be buried in the library shelves and not referred to, whereas Journal articles are usually more completely read and remembered.

H. V. W.

Transactions of the Ophthalmological Society of the United Kingdom for 1919, vol. 39, pp. 496. Illustrated with 10 plates and 31 figures in the text. London. J. and A. Churchill.

This volume includes papers presented both to the Annual meeting of the society, 28 in number; and those presented to affiliated Societies as follows: The Oxford Ophthalmological Congress, 6. The Midland Ophthalmological Society, 8. The Irish Ophthalmological Society, 13. The Ophthalmological Society of Egypt, 6. Only the North of England Society is not here represented. It can fairly be said that in general the character and quality of the papers furnished by the different societies are much the same.

The Bowman Lecture by V. Morax on Plastic Operations, the discussions on Visual Requirements of Aviators, and on Eyesight in Connection with Education, and the Doyne Memorial Lecture on Preventive Ophthalmology by J. H. Parsons, together occupy

about 125 pages. The other 53 papers are comparatively short, averaging something over 5 pages each.

The preceding volumes of these "Transactions" have been notable for the large number of short papers, mostly condensed case reports, that they contain. Scarcely any case occurs in practice that cannot be approximately matched by some case to be found in these pages. It is to be regretted that a larger number of English speaking ophthalmologists do not have this series at hand for frequent reference.

The illustrations are good and greatly supplement the text. Two of the plates representing fundus conditions are printed in colors. The others represent sections or macroscopic specimens of pathologic conditions. The volume is a worthy and welcome addition to our literature. E. J.

Transactions of the American Ophthalmological Society. Fifty-fifth Annual Meeting. 1919, v. 17, 741 pages. Illustrated by 24 plates, 10 in colors, and figures in the text. Philadelphia. Published by the Society. T. B. Holloway, Secretary.

It is only three years since the society ventured to devote a whole volume to each year's transactions; but the present volume is about as large as any of its predecessors containing the proceedings of two or three annual meetings. This doubling of the size of the annual transactions is largely due to the publication with them of theses, prepared by candidates for admission to the Society. Of these there are six, occupying 278 pages. It is clear that the requirement of a thesis, for admission, has been an important stimulus to the production of excellent, albeit rather long papers, by some of the younger American ophthalmologists.

The titles of these different theses, and their authors are: Persistent Posterior Fibrovascular Sheath of the Lens, Dr. Francis Lane; Antidiphtheritic Serum in Severe Ocular Infections, with Special Reference to Hypopyon Keratitis, Dr. Ben Witt Key;

The Eye in Hereditary Syphilis, Dr. John Green, Jr.; Diagnosis and Treatment of Luetic Involvement of the Optic Pathways, Dr. Mark J. Schoenberg; Military Ophthalmology, Dr. Lloyd B. Whitham; Vernal Conjunctivitis, Dr. W. H. Luedde.

This volume is especially notable for the number and excellence of its colored plates, in which it excels any preceding volume in its series; and any contemporary transactions of any ophthalmological society in the world. There are 10 of these plates, of which 3 are reproduced thru the courtesy of the Medical Bureau of the British War Office, one from this journal; and others, including two of charts of color fields, and of various ocular conditions, are original with these transactions.

These plates are of great educational value. In this day of better training for those who practice ophthalmology, it is to be hoped that this society will take active steps to bring its valuable transactions to the notice of a much larger proportion of those engaged in this special line of practice, to the end that it may find its proper place in the library of every American ophthalmologist. E. J.

Dynamic Skiametry and Methods of Testing the Accommodation and Convergence of the Eyes. By Charles Sheard, A.M., Ph.D., 112 pages. Illustrated with 18 diagrams. Chicago. The Cleveland Press.

This is reprinted from volume XV of the American Encyclopedia and Dictionary of Ophthalmology. In his "Foreword" the author expresses the hope, "that it will call attention to the desirability—if not the necessity in most cases—of making various dynamic as well as static tests upon a pair of eyes." "It does not follow that a satisfying of the static demands of a pair of eyes will likewise afford a sufficient relief of, or aid to, these eyes when they are accommodating and converging." "It, therefore, behooves every practitioner upon the eyes to engage in tests which may be classed as dynamic as well as those known as static."

All who are engaged in measuring eyes for glasses, and have sufficient intelligence and knowledge for that service, will do well to obtain this book and study it, if they have not already become acquainted with its contents in the Encyclopedia. E. J.

Bulletin de la Société Belge d'Ophthalmologie. No. 40. Analytic Report of the Meeting of November, 1919. 101 pages, 6 halftone plates, Brussels, 1920.

The appearance of this number marks the full resumption of the scientific activities of the Belgian Society of Ophthalmology, which had for many years, prior to 1914, been one of the important sources of the better grade of practical ophthalmic literature.

This number contains 19 papers, an average of 5 pages to each, and thruout they preserve that direct practical character, which makes them of high value and interest to the practitioner of ophthalmology. They have been given to our readers in abstract p. 361 of this Journal. Included among them are three by French leaders in ophthalmology, de Lapersonne, Landolt and Lagrange. Prof. Nuel of Liège in his introductory remarks welcomed the presence of these men as a sign of the closer association of France with Belgium in the pursuit of science.

The list of members here published gives 114 names of whom 42 were registered at this meeting. There are also included portraits of two deceased members, Arens and Marzorati, with brief accounts of their principal achievements. E. J.

Transactions of the College of Physicians of Philadelphia. 3rd Series, vol. 40, for 1918. 308 pages, illustrated. Philadelphia. Printed for the College.

In this volume the proceedings of the Section on Ophthalmology occupy 46 pages, while the two other sections represented use but 11 pages. The scientific proceedings of especial interest to ophthalmologists are already accessible in the pages of this Journal.

Textbook of Ophthalmology. Paul Roemer. Director in the University

of Greifswald. Third Remodeled Edition. 496 pages with 297 illustrations in the text and 32 colored plates. Urban and Schwarzenberg. Berlin and Wien, 1919. 30 M.

Roemer's well known book has been so favorably received that, within 8 years, 3 editions became necessary. Differing from the general rule pursued in textbooks that each succeeding edition shows an increase in volume over the former, this one followed the opposite course by decreasing from 1028 to 828, and now to 496, pages. By this condensation the new edition has by no means lost in value, but greatly gained in practical usefulness.

This work excels in clear exposition, good concise style, which makes it easily readable, and by the great abundance of splendid illustrations. It does not simply enumerate the facts which constitute the regular subject matter of ophthalmology, but by entering into discussions of scientific investigations it stimulates the interest of the reader, and calls his attention to problems still to be solved.

To mention only a few instances, the chapter on glaucoma is preceded by a very interesting exposé on the interchange of fluids in the eye; in which the author maintains, and gives his reasons for it, the contention of Hamburger of the normal watertight separation of anterior from posterior chamber by the contact of iris and anterior capsule. He opposes Leber's view of the function of the canal of Schlemm as the main passage of efflux; and of the origin of the aqueous from, and its constant production by, the ciliary processes; showing that it was arrived at, not from facts of normal physiology, but from pathologic changes. The discussions on the physiology and pathology of the pupil, the relation of the 5th nerve to the eye, the ocular palsies and their diagnostic problems, the eye symptoms in a series of diseases of the brain and spinal cord, etc., are excellent. There is also a good chapter on simulation, with description of new methods of its exposure. The external appearance is very nice, and the use of different types greatly aids orientation. C. ZIMMERMANN.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities.

DEATHS

Christopher P. Linhart, Columbus, Ohio, aged 59, died April 15, 1920, from pneumonia.

John Peter Marshall, Warren, Ohio, aged 57, died April 15th from septicemia.

PERSONAL

Dr. Dunbar Roy, of Atlanta, Ga., announces the association with him of Dr. Murdock Eguen, late of the Brooklyn Eye and Ear Hospital.

At the June meeting of the Ohio State Medical Association Dr. Charles Lukens, of Toledo, assumed his duties as President of the Society.

Dr. A. C. Snell, of Rochester, N. Y., has been elected Chairman of the Section on Eye, Ear, Nose and Throat, of the New York State Medical Society for 1920.

Dr. Raymond J. Sprowl, until recently associated with Dr. George F. Keiper, of La Fayette, Indiana, is now located with his brother Dr. Fred Sprowl at Spokane, Washington. Both are in the practice of ophthalmology and oto-laryngology.

Mr. Russell Tyson of Chicago has been elected to membership on the Board of Directors of the National Committee for the Prevention of Blindness. Mr. George D. Eaton of Iowa will become Field Secretary on June first. He has been Superintendent for ten years of the College for the Blind at Vinton, Iowa.

At a meeting of the New England Ophthalmological Society held Tuesday, April 20th, a complimentary dinner was tendered Dr. William Zentmayer of Philadelphia. Following the dinner Dr. Zentmayer addressed the Society upon the subject of "Recurrent Vitreous Hemorrhage in Adolescence."

Dr. Mortimer Frank of Chicago began the translation of Choulant's "History of Anatomic Illustration" in 1916. This book, published in 1852, is one of the classics of medical literature. Dr. Frank finished his task and turned the manuscript over to the publishers just before his untimely death on April 21st, 1919. A committee of his friends has chosen this volume as a fitting memorial to Dr. Frank.

Professor Julius Hirschberg of Berlin has completed his History of Ophthalmology, which may appear in book form after conditions are more settled in Germany. The "Centralblatt für praktische Augenheilkunde," founded by him in 1877, which was published regularly for forty-three years

was suspended December 1919 on account of the high cost of printing—at that date it having risen four hundred and seventy-five percent over former times, and is still rising.

In 1913 Hirschberg was awarded the silver medal for advancement in Sciences by the Berlin Academy of Sciences. In 1918 he received the gold medal. March 24, 1920, his golden anniversary as teacher in the Frederick William University of Berlin was celebrated. During the last winter he has been given lectures on the History of Ophthalmology.

An event of more than local importance took place recently when Her Excellency Lady Willingdon opened the Elliot Ophthalmic School in connection with the Government Hospital in Madras, India, in recognition of the services rendered by Lt.-Col. R. H. Elliot to ophthalmology in Madras and elsewhere. The teaching will be in the hands of Lt.-Col. H. Kirkpatrick.

SOCIETIES

The last meeting of the French Society of Ophthalmology took place on May 3rd, at 51, Rue de Clichy. Dr. Gonin of Lausanne opened the discussion on the pathogenic and pathologic anatomy of retinal detachment.

At the meeting of the Chicago Ophthalmological Society, May 17th, papers were read by Dr. Herbert Walker on "A Modified Trephine Operation for Glaucoma" and by Dr. Charles G. Darling on "Sarcoma of Lid."

Dr. Harvey J. Howard read a paper on the "Origin of the Vitreous Humor in the Human Eye" before the China Medical Missionary Association Conference at Peking, the first week in March. This paper will appear later in the JOURNAL.

The courses in Ophthalmology which were suppressed from the curriculum of the University of Mexico in 1915, the last professor being Dr. M. Uribe Troncoso, have been resumed, Dr. Emilio F. Montano having been appointed to the chair.

Dr. Daniel M. Velez has been made Professor of Ophthalmology in the School of Advanced Studies, a Department of the University of Mexico.

The Pacific Coast Oto-Ophthalmological Society will meet in Portland, Oregon, July 29-30-31, 1920. Dr. John Gordon Wilson, Professor of Otology, Northwestern University, will be the guest of the society.

Our Roumanian colleagues have founded in Bucharest a Society of Ophthalmology, and have elected, President, Professor Constantinesco; Treasurer, Dr. Rasvan. We heartily welcome this new society into the brotherhood of ophthalmic associations and hope to profit by the contributions which we feel sure they will make to the study of our specialty.

At the April meeting of the Kansas City Eye, Ear, Nose and Throat Club operative clinics were held in the afternoon by Drs. V. W. McCarty, S. E. Roberts, J. H. Laning, J. S. Lichtenberg, and D. L. Shurnste. In the evening Dr. J. S. Weaver presented a case of brain lesion with eye involvement; Dr. J. W. Kimberlin, one of monocular trachoma. Dr. I. D. Kelley of St. Louis had a paper on "Sphenoidal Inflammation in Relation to Optic Neuritis and Vidian Nerve and Spheno-palatine Ganglion Headaches."

At the May meeting of the Kansas City Eye, Ear, Nose and Throat Club Dr. W. E. Keith presented a paper on "Headaches of Intra-Nasal Origin"; Dr. R. J. Curdy one on "Magnet Extraction of Intra-Ocular Foreign Bodies." Dr. J. W. May showed a case with a piece of glass in the vitreous; eye quiet for past four years and vision 20/40.

The following officers were elected for the ensuing year: Chairman, Dr. J. S. Lichtenberg; vice chairmen, Dr. J. G. Dorsey of Wichita and Dr. H. E. Thomason; Secretary-Treasurer, Dr. A. M. Painter. There are now eighty members in this club, about half from Kansas City and half from surrounding towns.

The Oxford Ophthalmological Congress will assemble at Keble College, Oxford, on the evening of Wednesday, July 14th next, and the meeting will be held on Thursday the 15th and Friday the 16th. On Thursday a discussion on "Perimetric Methods" will be opened by Dr. Luther C. Peter, of Philadelphia. The Doyne Memorial Lecture will be delivered on July 16th by Mr. F. Richardson Cross, the subject "The Nerve Paths and Centers Concerned with Sight." A general meeting will be held during the Congress upon a time and day to be announced in the final programme. We understand that several distinguished foreign guests are expected to attend this meeting of the Congress. Further particulars may be obtained from the Secretary, Mr. Bernard Cridland, Salisbury House, Wolverhampton.

SOCIETIES

The German Ophthalmological Society will meet this year in Heidelberg on the 5th, 6th, and 7th of August. Those wishing to take part in the meeting must notify the Secretary some time before the 30th of June. Notifications later than this will be accepted according to the wishes of the society at the time of the meeting. Papers are limited to fifteen minutes, demonstrations to five minutes. Members of the society are for-

bidden to present papers at the meeting which have been previously published. The manuscripts and discussions, as well as illustrations, must be given to the Secretary before the end of the meeting.

MISCELLANEOUS

The New England Accident Prevention Congress held its Conference in Worcester, March 9th, 10th and 11th. The National Committee for the Prevention of Blindness co-operated by sending its mounted exhibit on Eye Hazards in the Industries.

The Pennsylvania Association for the Blind offers each year a prize of one hundred dollars for the best essay on "Prevention of Blindness," written by a student of the graduating class of the medical school of the University of Pittsburgh. The prize for this year was won by Dr. Albert D. Frost. Dr. Frost's paper will be printed by the Association and sent to interested persons.

The Illinois State department of public welfare, in cooperation with the college of medicine of the University of Illinois, has opened the first of a series of free clinics for the preventive treatment of eye diseases, at Mount Vernon, Illinois.

English Notes—James A. Ross has been appointed consulting ophthalmologist to the Educational Authority of Cumberland and consulting oculist to the Educational Authority of Dumfriesshire. James Eaton has been appointed assistant ophthalmic surgeon to Harrogate Infirmary.

Corporal Herbert Vickers a blinded soldier of St. Dunstan's at the recent examinations of the Incorporated Society of Trained Masseurs known throughout the world for their completeness, passed first in all subjects. That this is no mean accomplishment may be judged by the fact that there are nearly 300 entrants for this examination.

Drs. E. F. Parker, Charleston; C. W. Kollock, Charleston; E. R. Wilson, Sumter; P. V. Mikell, Columbia; Martin Crook, Spartanburg, and W. H. Nardin, Anderson, have been appointed by Dr. James A. Hayne, Columbia, state health officer of South Carolina, as a committee to investigate trachoma and other infectious diseases of the eye, and to formulate rules and regulations to prevent the spread of these diseases among school children.

On February 25th, Mr. Robert B. Irwin, Supervisor of Sight-saving Classes in Ohio, addressed the American School Hygiene Association which met in Cleveland in connection with the Superintendents' Section of the N. E. A. His subject was "Sight-saving Classes for the Partially Blind." Mr. Irwin illustrated his discussion with lantern slides showing the methods used in these classes. Preceding Mr. Irwin, Dr. F. Park Lewis of Buffalo, Vice-President of the National Committee for the Prevention of Blindness, spoke on the "Conservation of the Eyes of School Children."

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colo.

DIAGNOSIS.

- Argañaraz, R.** Examination of Eyes. *Se-mana Med.* v. 26, p. 794.
- Ferree, C. E., and Rand, G.** Visual Acuity at Low Illumination; Apparatus. (5 ill.) *Tr. Amer. Ophth. Soc.* 1919, p. 370-395. *Amer. Jour. Ophth.* v. 3, p. 335-341.
- Godwin, D. E.** Value of Ophthalmoscope in Diagnosis of Systemic Disease. *Jour. Mich. Med. Soc.* v. 19, p. 31-33.
- Hess, C.** Perimetry and a Dot Perimeter. *Arch. f. Augenh.* v. 84, Ht. 1-2. *Abst. Cent. f. p. Augenh.* v. 43, p. 180.
- Howard, H. J.** A Stereomicrometer. (1 ill.) *Amer. Ophth. Soc.* 1919, p. 395. *Amer. Jour. Ophth.* v. 3, p. 417.
- Köllner.** Visibility of Hyaloid in Vitreous. *Arch. f. Augenh.* v. 83, p. 12. *Abst. Rev. Gen. d'Ophth.* v. 34, p. 106.
- Mello, G. de.** Electric Ophthalmoscope. *Bol. da Acad. de Méd. Rio de Jan.* v. 90, p. 747.
- Schiötz, H.** Tonometry. *Brit. Jour. Ophth.* v. 4, p. 201-211.
- Staicovici, N., and Lobel, A.** Tonometry. *Arch. d'Ophth.* v. 37, p. 238-244.
- Wilder, W. H.** Requirements and Experiences in Ocular Examinations in Army. *Tr. Amer. Ophth. Soc.* 1919, p. 45-54.
- Würdemann, H. V.** Fundus of Eye after Death. (1 col. pl.) *Amer. Jour. Ophth.* v. 3, p. 321-323.

THERAPEUTICS.

- Cantonnet, A.** Atropin. *Rev. Gen. de Clin. et de Therap.* v. 33, p. 689.
- Finnoff, W. C.** Ethylhydrocuprein Poisoning. *Amer. Jour. Ophth.* v. 3, p. 360.
- Klock, V.** Radioactive Therapy and Eye Disease. *Inaug. Diss.* 1914. *Abst. Cent. f. p. Augenh.* v. 42, p. 32.
- Lottrup-Andersen, C.** Phototherapy in Ocular disease. *Hosp.-Tid.* v. 62, pp. 1217; 1242; 1263; 1289; 1316.
- Maddox, E. E.** Artificial Epistaxis for Ocular Inflammations. *Brit. Jour. Ophth.* v. 4, p. 231.
- Marbaix.** Sterile Collyria in Ocular Diseases. *Belgian Ophth. Soc.* April 25, 1920.
- Schneider, W. F.** Iontophoresis in Ophthalmology. *Klin. M. f. Augenh.* Oct.-Nov., 1919. *Abst. Clin. Optht.* v. 24, p. 124-132.
- Uddgren, G.** Value of Milk Injections in Ocular Therapeutics. *Stockholm*, 1918. *Abst. Clin. Optht.* v. 24, p. 145.

Repeated Titles. **Dor.** (v. 3, p. 237) *Brit. Jour. Ophth.* v. 4, p. 240.

OPERATIONS.

- Grimsdale, H., and Brewerton, E.** Text-Book of Ophthalmic Operations. 1920. 438 p. 18 ill. London: Bailliere, Tindall and Cox.
- Loeb, C.** Study of Local Anesthetics. *Amer. Jour. Ophth.* v. 3, p. 299.
- Maddox, E. E.** Small Improvement in Skin Grafting. *Brit. Jour. Ophth.* v. 4, p. 231.
- Van Lint.** Prevention of Postoperative Infection by Injection of Milk at time of Operation. *Belgian Ophth. Soc.*, April 25, 1920.

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THE COORDINATION OF REFRACTION WITH SPECTACLE AND EYE GLASS FITTING

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This paper points out the importance of a fixed base line passing thru the external canthi for the 180° meridian. It describes a trial frame and methods for securing this base line and other advantages of exact placing of correcting lenses.

The art of refracting and that of spectacle and eye glass fitting are successive steps of a single process. I will show why there must be perfect co-ordination between them and that the therapeutic results will otherwise fall below our just expectations, following a careful refraction.

In order to coordinate the two parts of this process it is essential that there be established on the faces of patients

certain fixed points, which will first determine the position of the trial frame and trial lenses, and subsequently determine the position of the correcting lenses. I intend to define these fixed points.

I selected for my use the trial frame seen in Fig. 9. This frame has been improved, and, at my recommendation, several features essentially new to trial frames have been added. The purposes

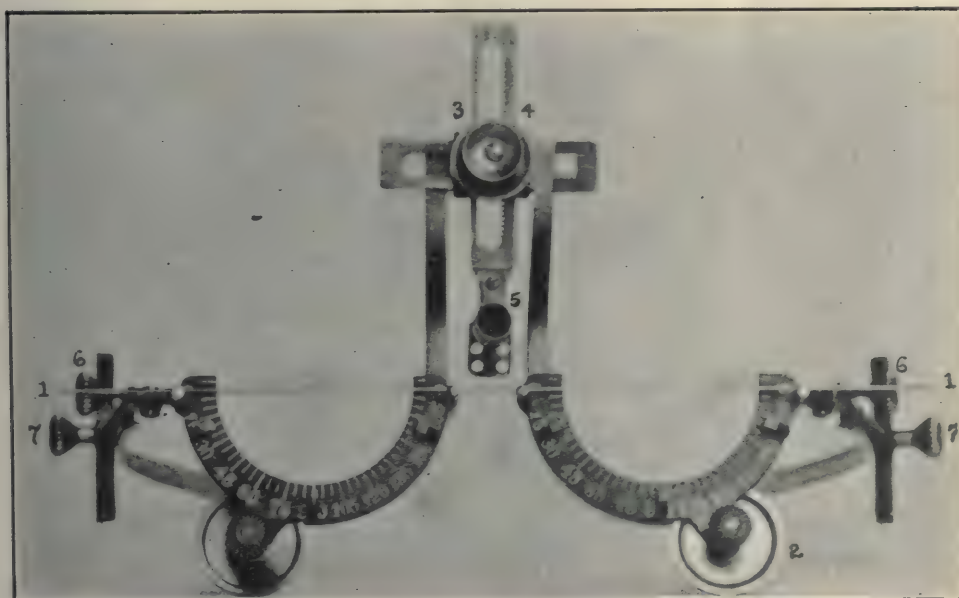


Fig. 1.—Rigid Front Trial Frame. (1) The 180° degree markings appear on both temporal and nasal sides for each eye, all four on one continuous line, as shown by the new horizontal test rod resting on four supporting pins. (2) Grooved friction wheel to rotate trial cylinders. (3) Ratchet wheel for centering right and left trial cells separately (one cell is never lowered separately). (4) Ratchet wheel for raising or lowering perforated conforming nose rest. (5) Ratchet screw for positioning nose rest forward or back. (6) Screw stem, one for each temple, controlling its spread, insuring even tension on both sides of head and the distance of both cells from the eyes. (7) Ratchet and wheel device for delicate control of the new, separately adjustable tilting temples. Tilt one temple only and the corresponding end of the trial frame is raised. Tilt both equally and the trial frame front is tilted forward from the top.

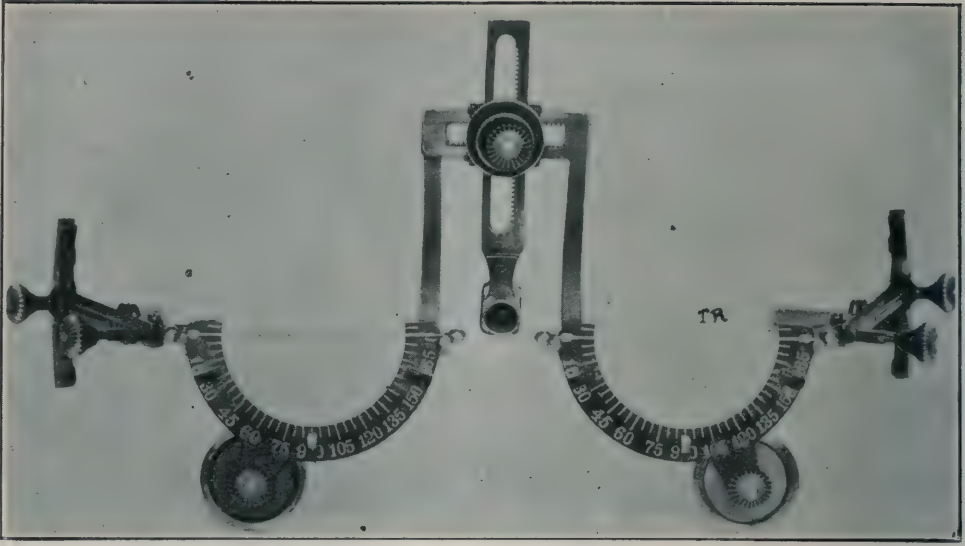


Fig. 2.—Each one of the short horizontal test rods (TR) should be opposite an external canthus when frame is correctly levelled.

of these new features will presently appear. The accompanying figures 1, 2 and 3 show the new frame in detail, attention being called only to its most characteristic features.

In order to coordinate refraction

with the fitting of spectacles and eye glasses, it is primarily necessary that a definite base line be employed as the 180 degree or horizontal meridian of the patient's face. Let it be understood that this line extends invariably from

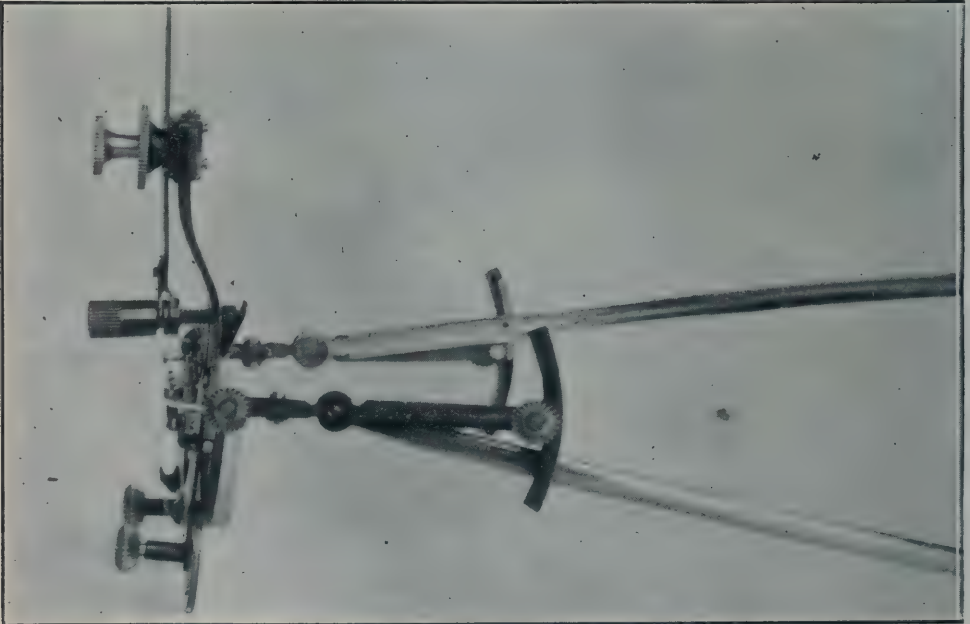


Fig. 3.—When one ear is higher or the face asymmetric it becomes necessary to tilt one temple more than the other, in order to bring the continuous horizontal line of the trial frame from opposite and parallel to the line extending from external canthus to external canthus.

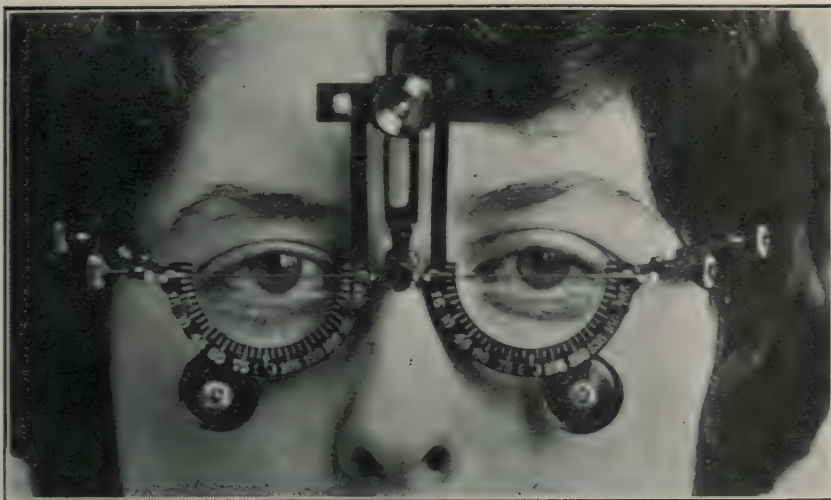


Fig. 4.—Patient's right ear is slightly the higher, hence the continuous horizontal line of the trial frame is too high on the right side.

the external canthus of one eye continuously to the external canthus of the other eye. The internal canthi are to be disregarded. Here then is a constant, definite, continuous base line between two fixed points, in fact, the only lateral fixed points available. It does not vary from day to day. The line is the same in all patients regardless of facial asymmetry or any kind of ocular deviation. The worse an asymmetry or a deviation, the more necessary are fixed

points from which to work off one's axes and to which to fit the glasses. In the majority of cases the line actually does cross corresponding levels of the two corneas.

The eye balls are not fixed points. The pupils are therefore not stationary. They cannot serve constantly and invariably as landmarks for a *fixed base line* or 180° meridian for both the trial frame and the finished spectacles or eye glasses. They cannot serve because their positions are

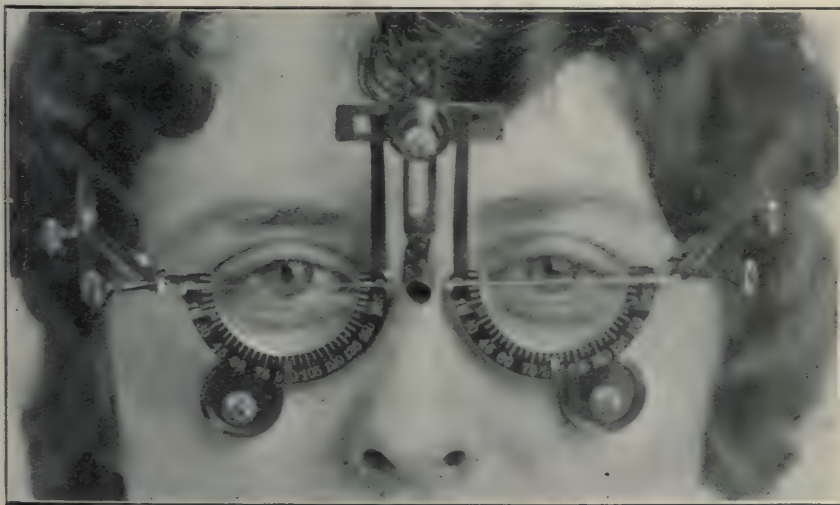


Fig. 5.—The defective position shown in Fig. 4 is corrected by a slight turn on the right Temple-Tilting Ratchet-Control. Continuous horizontal line of trial-frame point is now opposite and parallel to the line extending from external canthus to external canthus.

altered by every movement of the head, because ocular deviations and nystagmus are common, because pupils are often irregular, unequal and displaced.

Heretofore no attempt has been made or any equipment designed, definitely to coordinate the 180° meridian of the refraction table with the 180° meridian of the spectacle and eye glass fitting table. Let us put this new equipment into practical application.

Figure 4 shows the trial frame on the face of a patient to be refracted. The

Now place any two perfect trial cylinders in the frame at axes 180° . (Fig. 6.)

Note how their axis markings coincide at all points with those on the frame. These cylinders will also be true at both poles at any other axes to which they may be turned.

At this point let us suppose that we have to refract a patient with a decidedly asymmetric face. See Fig. 7.

Many skillful adjusters take a look at a face like this, which has more or less irregularity of facial contour and decide

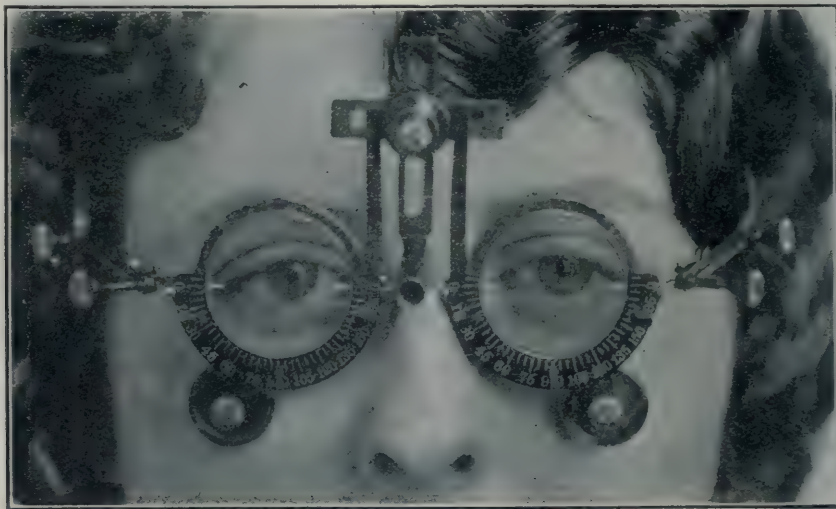


Fig. 6.—The four 180° degree axis markings of the two perfect trial cylinders, coincide with the four 180° degree markings on the trial frame. They will be true at both poles at any other axis to which they may be rotated.

horizontal test rods show that the four 180° degree markings on the trial frame are on one continuous line, as they should be. The right ear of this patient is slightly higher than the left. Hence the right test rod is somewhat higher than the patient's right external canthus. The frame is not yet positioned exactly right.

The slightly inaccurate position of the trial frame on the patient shown in Fig. 4 is corrected by a slight turn of the temple-tilting ratchet-control which brings the horizontal line of the trial frame into the correct position shown in Fig. 5. Now each rod crosses an external canthus. The frame is in correct position as far as the 180° meridian is concerned. The rods are withdrawn.

that one eye is higher than the other. Accordingly they establish two horizontals at different levels, adjusting the spectacles or eye glasses according to this conception. Such are working with absolutely no basis. The horizontals they establish are at *right angles to an indefinite line guessed to be the vertical meridian*. The oculist may not have used the identical lines when deciding the cylinder axes. A new optician may make a new guess. There is no coordination. A glance at Fig 7 will show that a cylinder prescribed at an axis of, say 105° , can have more than one position according to the taste of the optician.

One very high priced trial frame is on the market which permits the lowering or raising of one trial cell independently of

the other. It establishes two different levels for the horizontal meridian. With it, refracting may be done from one indefinite horizontal, and the adjustment made at some other horizontal.

In an endeavor to give the satisfactory result expected from the prescriptions of eminent oculists, it is quite common for very careful dispensing opticians to experiment a little in their adjusting of high cylinders. All opticians, however, are not so solicitous.

It is also the custom of some very careful oculists to determine the axes of high cylinders with two or more different trial frames and to prescribe at an intermediate axis. I propose to eliminate these sources of uncertainty and error.

Just how difficult it is to decide how to place the ordinary trial frame on this patient with an asymmetric face is apparent in Fig. 8.

One ear slightly or even considerably higher than the other is of extremely frequent occurrence. The resultant defective position of this trial frame, which is probably the one in most common use, may escape notice entirely. If discovered however, its position can be corrected only by bending down one of the bows of the trial frame or by placing cotton on top of the patient's low ear.

Fig. 9 shows him with another trial frame unequipped with the test rods or the separately adjustable tilting temples.



Fig. 7.—Patient with decidedly asymmetric face. The left eye appears to be higher than the right. The lines show that a cylinder prescribed at axis of 105 degrees might, in this case, have more than one position according to the habit of the optician. The line EF cannot form an angle of 105 degrees with both lines CD and AB. The continuous line AB is the one to which the continuous horizontal line of the trial frame, as well as the continuous horizontal line of the prescribed spectacles must always be opposite and parallel.



Fig. 8.—Shows the impossibility in this case of securing a satisfactory position for the trial frame probably in most common use.

Without the latter the frame cannot be levelled.

Fig. 10 shows the problem solved in this case, with the new trial frame so adjusted by means of the separately adjustable tilting temple device, that the continuous horizontal line of the trial frame is brought exactly opposite and parallel to the horizontal line of the face, which extends from external canthus to external canthus.

Fig. 11 shows this patient properly fitted with a straight front pair of spectacles. Each of the round lenses in this frame is marked by two diamond dots, one near each end of the 180° meridian of each lens. White pencil lines have been drawn between the dots. All these four dots fall exactly on one line. This line crosses each external canthus.

In this case refraction has been perfectly coordinated with the spectacle



Fig. 9.—Shows patient with new trial frame but without my separately adjustable tilting temples or the pins to support test rods. With this frame, too, there is no certainty that the cylindric spectacle lenses will occupy the same relative position to the eye as the trial cylinders

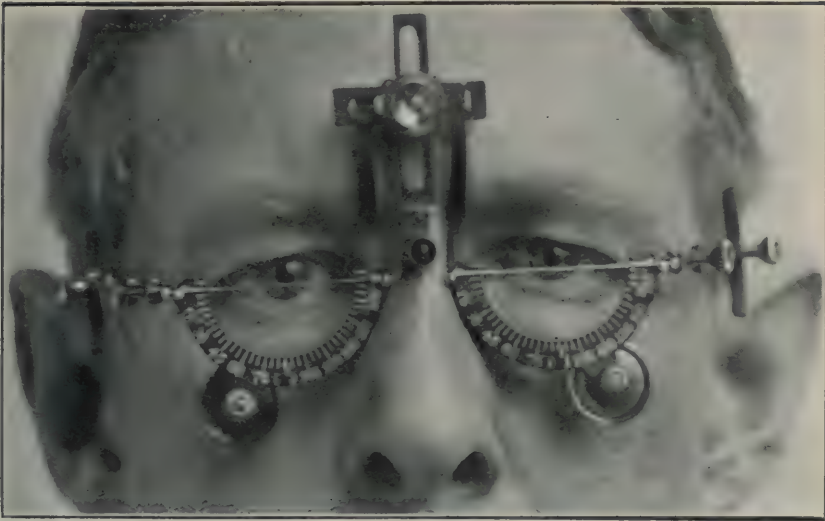


Fig. 10.—By delicate manipulation of the separately tilting temples, the trial frame is now positioned so that each test rod appears opposite an external canthus. The continuous horizontal line of the trial frame is opposite and parallel to the continuous horizontal line of the face. Now it is certain that the cylindric spectacle lenses will occupy the same relative position to the eyes as the trial cylinders. Coordination of axes.

fitting. The horizontal line of the spectacles coincides with the horizontal line of the trial frame and both coincide with the horizontal line of the face.

Height.—The horizontal base line previously designated, determines also the height of the centers of the trial-

frame lenses, and it predetermines the height for the centers of the lenses of the finished spectacles or eye glasses, as shown by white pencil lines across their horizontals, each opposite an external canthus.

Lenses so positioned are found to be



Fig. 11.—Patient properly fitted with a straight front pair of spectacles. Each of these round spectacle lenses is dotted with two diamond dots, one near each end of the 180 degree meridian of each lens. White pencil lines have been drawn between the dots. All these four dots would fall on one continuous line. This line crosses each external canthus. The continuous horizontal line of the spectacles coincides with the fixed horizontal line of the face.

placed centrally before the natural bony orbital aperture as seen in Figures 16, 17 and 18.

The position I insist on is much higher than the one to which opticians seem accustomed to adjust lenses. My lenses also have more tilt and are closer to the eyes. I have had to battle with opticians to get high adjustments, and yet I find that the line to which I refer is no higher than the lower margins of the undilated pupils.

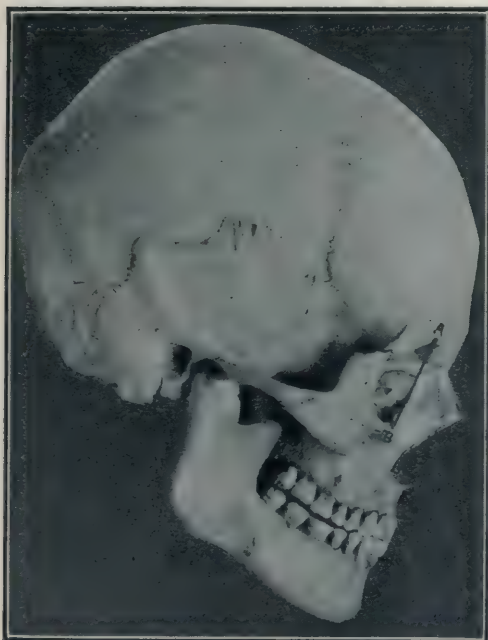


Fig. 12.—The line AB indicates the correct tilt for the lenses of the trial frame, also for the correcting lenses in spectacles or eye glasses.

The bridge of spectacles, be it metal or shell, must be so constructed that it can rest on the natural first little bend of the nose, even if this is low. The shanks of a metal bridge must carry the lenses thence upward to the proper level. A shell or zylonite spectacle crest can also be placed sufficiently low on the frame so that, no matter how flat the nose be, the right height of the lenses may be obtained. No amount of tightening or shortening of the spectacle bows will combat the force of gravity if the bridge shanks do not raise the lenses sufficiently. No bridge will rest on a vertical surface.

View the wearer's profile. If spectacle lenses are at the correct height the spectacle temple will be seen to cross the external canthus, as in Fig. 15, and this is the height at which the refraction is to be done.

By insisting on this high position I have given innumerable patients that comfort which they have constantly sought for themselves, by habitually pushing their glasses upward; I have contributed greatly to the improvement



Fig. 13.—Shows trial frame so adjusted by means of delicate tilting temple device that the plane of the trial lenses is exactly parallel to the bony orbital aperture, or the imaginary line AB.

of their personal appearance with glasses; and have permitted them to use their eyes, most nearly in the primary position.

Lenses for reading or close work exclusively, may be slightly lower, but not much. They must also be given a greater tilt.

My new trial frame admits of exact adjustment as regards height and tilt; for height, by means of a central wheel; for tilt by means of the adjustable tilting temples. The tilting of both temples together tilts the trial frame front.

Of the correct tilt for lenses used con-

stantly, I will presently have more to say; meanwhile I would call attention to this fact, which, in connection with both height and tilt of lenses, must be given due consideration. Patients bring the depressors of the eye ball into action much more while the eyes are being tested than at other times. Ordinarily a book or paper is elevated, while at desk or lap work the individual inclines the head, neck and back sufficiently so that the eyes may be used in the position of

A B on Figure 12. This is the natural bony orbital aperture.

We must begin however, by doing the refracting with the trial lenses in this correctly tilted position. To do this both temples of the trial frame must be given a sufficient downward slant, as has been done on the patient shown in Fig. 13.

It is essential therefore, that the trial frame be one which permits of this adjustment. The nonadjustable angle at

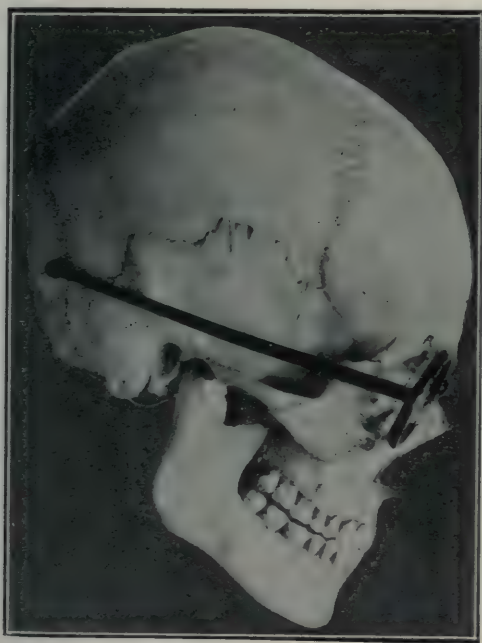


Fig. 14.—The result aimed at, the correcting lenses parallel to the line AB, the bony orbital aperture.



Fig. 15.—Shows correcting lenses in the same relative position as the trial lenses shown in Fig. 13, and parallel to the imaginary line AB of Fig. 12. Coordination of tilt. That the height is correct is shown by the spectacle temple crossing the external canthus.

greatest ease, namely as nearly as possible in the primary position (undepressed).

Tilt.—The obtaining of the correct tilt for ophthalmic lenses is not to be a matter of chance, or left to the personal taste of the optician who happens to do the fitting.

Nature has supplied bony landmarks for this adjustment. Lenses that are to be worn constantly should be parallel to a line extending from the center of the upper, sharp, thin, bony rim of the orbit to a corresponding point on the lower sharp, thin, bony, orbital rim. They should be parallel, namely, to the line

which the most commonly used trial frame sets, is usually not the right one, even for distant testing. The tilt of the trial frame is not correct unless it coincides with the one that the correcting lenses are to have.

The tilt I prescribe for constantly used lenses seems to be greater than that which opticians are in the habit of giving. My lenses are also brought much nearer to the eyes and are placed higher than in the ordinary run of adjustments. While tilting temples for the reading test have been provided in some trial frames, for instance in the "Genophthalmic"

frame, they are not susceptible of delicate separate adjustment. They were not devised, nor can they be used for the purpose of leveling the trial frame front to a certain fixed-base-line-position, or for the purpose of fixing the trial lenses parallel to the orbital apertures in distant testing.

Having completed a refraction with the new trial frame, with trial lenses in the correctly tilted position, we must

By means of two central adjusting wheels on the new trial frame, the eyes may be separately centered, using cross line trial lenses or the centrally beaded short horizontal rods. Subsequently the prescribed correcting lenses are to be similarly centered.

In the new equipment the trial lenses are thin. There is very little space lost between sphere and cylinder. The trial lenses are adjusted as close to the eyes



Fig. 16.—Whether spectacles or eyeglasses are worn and in all cases the conception of the axes of the lenses should be analogous to that in the figure. The cylinder axis XY forms an angle of 105 degrees, not only with the segment CD, but with the entire line AD. The line AD is always a straight line and is always opposite both the external canthi.

next see that the correcting lenses be given the identical tilt. Fig. 14 shows the result aimed at, the finished lenses parallel to the line A B, the bony orbital aperture.

Fig. 15 shows the patient with spectacle lenses at the correct tilt, their planes parallel to the imaginary line A. B. Co-ordination of tilt. The same tilt can be obtained with eye glasses.

INTERPUPILLARY DISTANCES AND DISTANCE FROM CORNEAS

Authorities are in accord that the optical centers of correcting lenses should fall on the visual lines. Hence the distance between the optical centers of correcting lenses should actually be somewhat less than the distance between the patient's pupils, as opticians measure.

as possible and considering that they have also the correct height and tilt, the distance of the test lenses from the corneas may be made to coincide almost exactly with the distance which the prospective correcting lenses will have from the corneas. I need not dwell on the importance of these coordinations.

Having established that position for my trial lenses which I expect my correcting lenses to occupy, I leave the positioning of the latter to no uncertainty. My opticians are instructed. I educate my patients too, so that they are satisfied only with the highest standard of manufacture and the most painstaking adjustments.

Both lenses in either spectacle or eye glass frames are marked with two diamond dots on the posterior surfaces,

one near each end of the 180° meridian of each lens. In frameless spectacles the screw holes serve as these points. In frameless eye glasses drilled in centre, one dot on each lens is sufficient. If drilled above centre, two dots are required on each lens, marking the 180° meridian at both ends of each lens. If one lens be a sphere and one lens a cylinder, I require nevertheless that both lenses be dotted on the 180° meridians. My reason for so doing is set forth under Fig. 16.

1. It is frequently crooked.
2. The axis scale is as a rule too short. It does not immediately reveal, as it should, its own crookedness or faults in the markings of the trial cylinders.
3. It is rigid only when brand new.
4. The cells permit the lenses often to be placed in faulty positions.
5. There is no provision to guard against the error resultant from one ear being higher than the other.
6. The trial lenses, as a pair, can not



Fig. 17.—The position of the trial frame and the trial lenses predetermines the position of the correcting lenses. In every instance, the white line shown in Figs. 17 and 18 must be drawn when the first adjustment is made. For every readjustment it is absolutely essential that the horizontals, between the ever-present dots, be marked by a white line.

When glasses are to be adjusted or to be readjusted, I require that opticians connect the diamond dots indicating the horizontal meridians by a white pencil line. The glasses are then to be set, so that this line passes out at each external canthus. The first fitting requires in addition, vertical white pencil lines thru the geometric centres of each lens. These verticals must appear opposite the pupillary centres.

The accompanying figures 17 and 18 show glasses white-pencil-marked and adjusted.

THE TRIAL FRAME.

The commonest faults of the ordinary trial frame are:

be tilted to a position parallel to the bony orbital apertures.

7. A few trial frames, only, give any tilt for reading.

8. The ordinary trial frame is provided with no adjustment of the temples to correct a tendency of one cell to be nearer the eye than its fellow, except by shortening a temple to pull harder on one ear.

9. It does not permit perfect coordination of refraction with spectacle and eye glass fitting.

My new trial frame, not only overcomes the preceding list of faults but has the following additional advantages:

1. Absolutely rigid front.

2. Axis scale shows all four 180° markings always on one line, as shown by a straight horizontal test rod.

3. Four pins to support a single long, or two, short, straight, centrally beaded horizontal test rods.

4. Adjustment to bring one cell nearer the center line than the other but *no adjustment to move one cell to a lower parallel than its fellow.*

5. Lateral adjustment screws for temples, insuring even lateral pressure and the equidistance of both trial cells from the eyes.

6. Delicate ratchet adjustment for tilting the temples separately or together. Used together the trial lenses are tilted so that their planes may parallel the bony orbital aperture, or so that they may be tilted more for the reading test. Used separately the horizontal straight line of the trial frame is made, in every instance, to coincide with the horizontal straight line of the face.

7. Thin lenses are used with little space between sphere and cylinder.



Fig. 18.—The verticals and horizontals should be marked for the first adjustment. The horizontals must be marked for every readjustment.

Other details concerning the Requisite Attributes of Properly Fitted Spectacles and Eye Glasses are referred to in a previous paper. Penna. Med. Journal, Dec. 1918.

WASP-STING KERATITIS, WITH SPECIAL COLOR CHANGES IN THE IRIS

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This report from the University Eye Clinic, of Professor Ichikawa, throws light on the characteristic changes produced by this rare but important injury. Translated from the German by S. R. Gifford, M. D.

The ocular changes provoked by bee and wasp stings are quite varied. Cases with stings of the lids have been reported by Zander-Geissler (1864), Hilbert (1904), Gepner (1907), Kraupa (1911), Purtscher (1911), and Orendorff (1911). Among these, in the cases of Gepner, Kraupa and Orendorff, there occurred also a keratitis, which took place secondarily by extension of the sting to the conjunctival surface.

Direct trauma to the cornea by wasp and bee stings is noted by Krieg (1842), Purtscher (1895), Gallemaerts (1896), Lewin and Guillery (1904), Lepplat (1894), Kaufmann (1904), Joachim (1904), Huwald (1904), Luniewski (1906), Kusama (1913), Koyanagi (1920).

As rare changes, Hilbert and Lewin-Guillery noted discoloration of the iris (the first, greenish discoloration of the iris); Huwald and Kaufmann clouding of the lens; Lundy acute glaucoma; Koyanagi acute glaucoma and cataract.

The literature of bee and wasp stings of the eye, aside from the last mentioned changes, which are of rare occurrence, is therefore seen to be already extensive enough so that a further communication might be considered as hardly necessary.

Concerning the pathologic anatomy, however, this is not exactly the case. For example, we know nothing as to the cause of the peculiar bluish discoloration of the iris. Huwald, Langer, Nagano-Oda, and Koyanagi have, indeed, investigated pathologic changes after wounds of this kind by the experimental method; and have, in a praiseworthy way, brought much to light. Of the cause of the iris discoloration, however, they have made no mention, as they did not succeed in producing this interesting bluish discoloration experimentally.

Recently I have had occasion to observe a case of keratitis due to wasp sting, in which, besides the corneal changes, bluish discoloration of the iris occurred. A piece of the iris so affected was secured, and was used for microscopic examination. I take the liberty of communicating the results of histologic examination of this piece of iris.

CASE.

The case concerned a forty-six year old farmer. The accident took place on September 24, 1919, when a wasp suddenly struck his left eye. Pain, lachrimation, and swelling of the lids followed at once, which disappeared after about twelve hours. The next day, however, he found that vision was poor in the left eye. He was brought to our clinic on October 25th.

PRESENT CONDITION.—The patient is a well-built man. The skin is of normal color, and shows no pathologic changes aside from moxa scars on the back. Cervical and cubital lymph nodes not swollen. Internal organs are likewise intact. Urinalysis negative. Appetite good.

OCULAR FINDINGS.—Ocular movements are free. The left palpebral fissure is narrower than the right, since the skin of the lids was somewhat reddened and swollen. However, even on closer examination of this region, no remains of the sting could be seen. Lacrimal sac intact. The palpebral conjunctiva shows nothing abnormal, except slight hyperemia. The bulbar conjunctiva is only slightly injected around the limbus.

The cornea shows in its entire extent a diffuse grayish opacity; which on examination with the loupe is seen to consist of numerous fine points, and which is more opaque in the center than peripherally. The single points are both

superficial and deep. The opacity shows no formation of new vessels. The whole surface of the cornea presents fine inequalities, and in the middle, a few vesicles from milium to pin-head size. A foreign body is not found in the cornea, tho I searched for one carefully with the loupe. The striate opacity of the cornea mentioned several times in the literature is not observed. The sensitivity of the cornea is wholly obliterated.

is impossible on account of the corneal opacity.

The lens shows in its center a superficial, irregularly outlined localized opacity. From the pupil a red reflex is barely obtained. Tension minus. L. V. =Fingers at two feet, not improved by glasses. Projection good.

The right eye has normal vision and shows nothing pathologic; the iris particularly shows a brownish color.

As treatment, hot applications, 5%

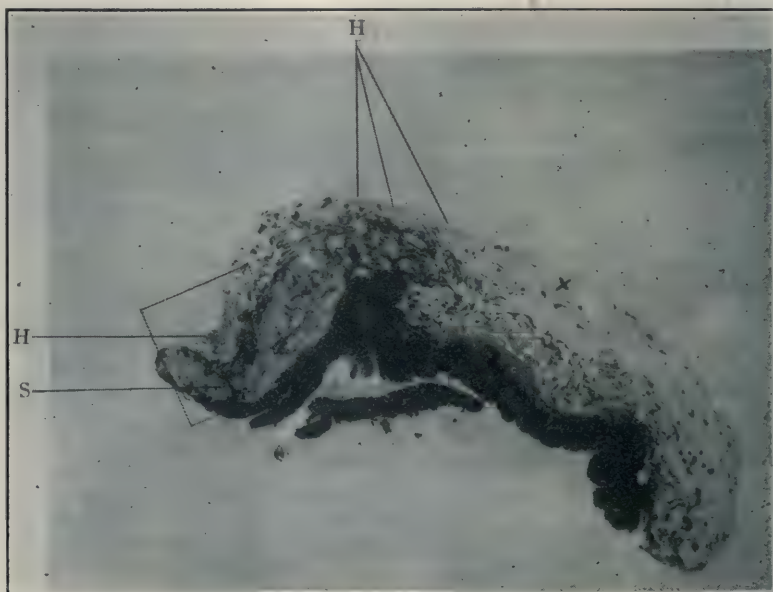


Fig. 1.—Section of iris removed for wasp sting keratitis seen with Leitz oc. 1, ob. 8. HH, hyaline masses on free surface of iris. S, Sphincter, partly denuded of anterior stroma. X, Swollen stroma.

The sclera is intact. The anterior chamber is of normal depth, and shows no hypopyon. The pupil is about 7 mm. in diameter (atropinmydriasis), perfectly round and shows no posterior synechiae.

The most striking change in the iris is its bluish discoloration. This is the more notable as the iris of the other eye is of a brownish color. The peripheral part of the iris on the affected side, however, showed a brownish color, this part has thus been spared by the pathologic change. The markings of the iris appear more or less notably washed out; but its exact examination

dionin ointment, subconjunctival injections of Na.Cl., a pressure bandage, etc., were employed. By these means the corneal opacity was somewhat improved. But there remained in the center a dense opacity, in which vesicle formation frequently recurred, without, however, any accompanying increase in tension.

Two weeks after admission, blood vessels appeared in the deeper layers of the cornea. The pupil remained dilated and did not react to light, tho no more atropin was employed.

On December 4th, an optical iridectomy was done above, and on Decem-

ber 5th, the patient was discharged with vision fingers at 2 feet.

The fragment of iris secured measured 2 mm. in breadth by 1.5 mm. in height. It was at once fixed in 10% formalin, embedded in celloidin and cut serially in sagittal sections.

MICROSCOPIC FINDINGS OF FRAGMENT OF IRIS.

The striking finding to be observed in the iris is the absence of its anterior

Another noteworthy finding is the presence of a peculiar hyalin-like mass on the free anterior surface of the iris. (Fig. 1. H_1 , H_2 .) The latter shows a flat configuration, is about $.3\mu$ to 1μ thick, is firmly adherent here and there to the surface of the iris, is larger towards the pupil than towards the ciliary region, and is in many places turned forward at both ends, or curled over. (Fig. 2. H_1 .) At the places where it shows a deepening on the surface of the iris,

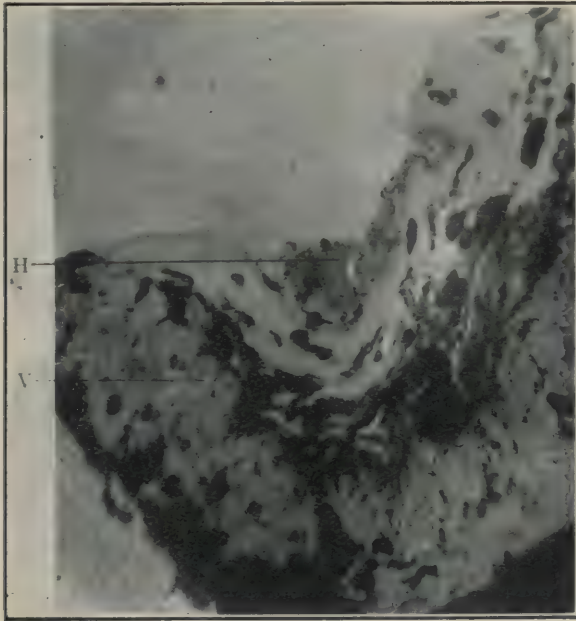


Fig. 2.—Portion of iris section included in square marked on Fig. 1. Enlargement Leitz oc. 1, ob. 7. H, Hyaline mass on anterior surface. V, Vacuole in sphincter tissue.

limiting membrane, together with its endothelium; so that the vascular layer is laid bare. (Fig. 1.) In several sections I observed at the pupillary border the sphincter laid entirely bare. The remaining tissue of the anterior stroma, now limited anteriorly by the free surface and extending posteriorly directly to the vascular layer proper, is unusually swollen; so that the characteristic reticular structure of this tissue can no longer be made out. (Fig. 1.x.) It has, on the whole, a smooth surface, but in parts presents deep furrows, and stains much less deeply with eosin than the vascular layer beneath.

it penetrates wedge-like into the iris. It stains red with eosin, yellow with Van Gieson-Weigert, violet red with Russell's stain, pale blue with Weigert's fibrin method, rose red with Loele's stain, and violet red with Pappenheim's methyl pyronia green.

In general, it appears homogeneous, but contains here and there shrunken nuclei of leucocytes and pigment granules; and is sharply differentiated from the underlying iris tissue. In places it appears more or less distinctly divided into leaves or processes, and shows small lacunae, which are chiefly placed with their long axes parallel to the iris

surface. It is, however, nowhere reticular.

In other respects the iris tissue presents a normal appearance; nowhere is pathologic engorgement of vessels and inflammatory invasion of leucocytes to be seen. The vessels themselves are likewise unchanged. The posterior limiting membrane and pigment cells of the pars iridica retinae are normal. The sphincter muscle is, as already mentioned, partially denuded of its covering anterior stroma layer, so it is left bare in places. (Fig. 1. S.). Its muscular tissue appears somewhat swollen and encloses many vacuoles; its nuclei, however, take the stain well. (Fig. 2. V.).

COMMENT.

That the peculiar bluish discoloration of the iris in the present case is the direct result of wasp sting, and does not concern a so called heterochromia, is clear enough from the above described histologic findings. Of these, the following are to be emphasized as especially important:

1. The absence of the entire superficial structure, of the anterior stroma layer.

2. The presence in places of peculiar hyalin-like masses on the free surface of the iris.

The staining properties of the latter are not, as above mentioned, quite typical for hyalin. That they cannot, however, concern fibrin which has exuded onto the iris surface, is apparent from their flat form, homogeneous appearance and nonreticular structure. Against this, also, is the fact that the ocular changes evoked by bee and wasp stings are predominantly of a degenerative type. The lens opacity in bee and wasp sting is, for example, not to be considered as belonging to the usual picture of traumatic cataract. The vesicle formation on the corneal surface must have its origin in degeneration of the epithelium.

Huwald in his experiment found necrosis of the anterior iris endothelium, without, however, any discoloration of the iris. Nagano and Oda also describe a necrotic change of the

endothelium on the posterior surface of the cornea in wasp sting. It might be well claimed from this that the superficial tissue of the anterior iris stroma was in the present case first changed by the toxic action of the wasp sting into a hyalin-like mass; then separated by spaces from the tissue beneath, divided into numerous small fragments, and finally thrown off into the anterior chamber. Whether the hypopyon in the anterior chamber mentioned in the literature in bee and wasp stings may arise, not at all from pus cells, but consist of this necrotic, cast off, hyalin-like iris tissue and endothelial cells, is not clear. In any case it is highly desirable in the future, to investigate microscopically the contents of the anterior chamber in cases of bee and wasp sting keratitis with hypopyon, in order to approach a solution of this problem.

The question now arises, whether the anatomic changes found in the iris are of a nature to explain satisfactorily the bluish discoloration of the iris observed clinically. This, I believe, may be justly affirmed: The iris color among us Japanese is well known to be usually brownish. That this brown color of the iris is due entirely to the richness in pigment of the iris tissue in Japanese, as opposed to the scarcity of pigment in the irides of Europeans, which are usually of bluish color, is true beyond a doubt. It is, therefore, quite intelligible that it should appear blue, like that of Europeans, when robbed of its richly pigmented anterior stroma layer, it becomes poorer in pigment. In Hilbert's case, the greenish discoloration of the iris had disappeared a week after the accident. This restoration of the normal condition in Hilbert's case is obviously not in accordance with my finding; since the iris change in my case is of an irreparable nature.

Finally there remains to be determined the cause of the mydriasis which, together with the iris discoloration, presented during the whole period of observation, one of the most striking symptoms. I found the development of vacuoles in the pupillary

sphincter. It is not to be proven out of hand that this change might be the cause of the mydriasis. On the other hand, it is not impossible that the nerve fibers, as well as the sphincter,

are affected by the wasp's toxin, and so produce the dilatation of the pupil. The insensitivity of the cornea might also well be traced to lesions of the nerves due to toxic action.

APPARENT SYMPATHETIC OPHTHALMIA, NINE MONTHS AFTER ENUCLEATION, WITH IMPLANTATION OF GOLD BALL IN TENON'S CAPSULE.

DAVID N. DENNIS, M.D.,

ERIE, PA.

In this case recurring attacks of inflammation and increased tension in the remaining eye cleared up under general and local medication without removal of the implanted ball.

The following case shows several interesting features:

A sympathetic secondary glaucoma, starting nine months after enucleation.

The irritating eye removed within two weeks of injury.

The recurrence of these attacks of secondary glaucoma, and their final subsidence, leaving a perfect field of vision, and an unusually high percentage of vision—20/10.

Did the implantation of an artificial ball play any part in producing, or inducing, the relapses? In view of the research work and the views brought out by this work, as shown in various papers read and published within the past few years, I think no connection can be found.

If the sympathetic inflammation had been a true iridocyclitis with exudates, I question whether one would have had the courage to allow the implantation to remain in. Even under these conditions, in the light of our changed theories, would the presence of the implantation make any difference in the course of the inflammation; provided of course, that the operation of enucleation had been done well, i. e. the nerve cut far back and the artificial ball properly anchored in Tenon's capsule?

In the case to be narrated, the question might be raised of its possible focal origin. This possibility I think can be eliminated. X-ray examinations of the teeth and sinuses were negative, as well as the examination of the tonsils.

CASE.—A. H., aged 17, I first saw on May 18, 1913, twenty-four hours after he had been struck in the right eye by a piece of steel broken from a hammer he was using. A local physician had tried the magnet in an effort to remove a possible foreign body. There was some doubt as to a foreign body being present.

Inspection showed a small central penetrating wound of the cornea, with some pericorneal injection. There was a slight hypopyon present; the lens was opaque, and there was only light perception. The vision of the left eye was 20/10.

The X-ray localized a foreign body 2 mm. by 2 mm., deep in the vitreous chamber.

Little encouragement was given in regard to saving any vision, or even as to saving the eyeball, but the family desired to have the foreign body removed and an effort made to save the ball. Haab's magnet was used to bring the particle forward in the vitreous, then the smaller hand magnet was used to work the metal into the anterior chamber. The chamber was then opened, emptying the hypopyon, and the steel was extracted thru the opening.

The eye remained reasonably quiet until May 31, 1913, when there was a recurrence of the hypopyon, the ball quite tender to touch, and more or less pain complained of.

The left eye showed normal tension, and a vision of 20/10. The patient was

urged to have the injured ball removed. This was done and a gold ball implanted in Tenon's capsule. There was no undue reaction following the operation; the healing was smooth and uneventful; the left eye remained quiet; there was no dread of light or change in the vision of 20/10.

He was discharged from the hospital on June 7, 1913. He returned later for inspection and adjustment of an artificial eye. At these visits, the vision remained 20/10 in the left eye and everything was perfectly quiet.

On February 17, 1914, he reported an alarming drop in vision. Four or five days before the visit, he first noticed a halo around artificial lights, then the drop in vision. Inspection showed no pericorneal injection; the pupil was dilated but active. There were many points of exudate on Descemet's membrane, but no exudate in the pupillary area, or in the vitreous. The tension was taken with the Schiötz instrument, and registered 30 mgm. The field of vision showed a full, normal field, but the blind spot area was very much enlarged. The accommodation showed a recession of the near point.

The patient entered the hospital, where pilocarpin sweats and inunctions of mercurial ointment were used systematically, and homatropin and eserine were used alternately, locally.

On March 9, 1914, the eye was perfectly quiet. The tension was 12 mm., and the vision 20/10. He was discharged from the hospital.

He again reported on April 29, 1915, stating that two days before there had been some pain in the eye, headache, a halo around the lights and some drop in vision. Inspection showed no pericorneal injection; the vision 20/15 and a recession of the near point. The pupil was active, and there were a few points of exudate on Descemet's membrane.

The deep media of the eye were clear. The tension again registered high—27 mgm. The patient again entered the hospital, where pilocarpin

sweats and inunctions were used; and locally a very weak solution of scopamine alternately with eserine, and the use of subconjunctival injections of normal saline.

On May 14, 1915, the eye being quiet, the vision 20/10 and the tension registering 18 mm., the patient was discharged.

He was seen at various times afterwards, the eye found quiet and the tension normal, until September 17, 1917; when he reported, complaining of a drop in vision, some pain, a halo around lights and a recession of the near point. The vision was 20/15; the tension registered 35 mgm. He entered the hospital, where I instituted the same plan of treatment as was used before.

On September 26, 1917, the tension registered 18 mm., the exudate on Descemet's membrane had cleared; and the vision had returned to 20/10. The field of vision was normal; there was no enlargement of the normal blind spot, and the accommodation was normal. He was discharged from the hospital.

In this case, the lymphocyte count was made as described by Gradle in the Archives of Ophthalmology, page 567, Volume 39. The count was made before the injured eye was enucleated, and several times during each period of inflammation. The characteristic increase in the small lymphocytes, and the decrease in the polymorphonuclears, was not shown at any time.

I have frequently seen these findings in traumatic irido-cyclitis. In conditions of this kind, the count is a help and should be made. When found positive, it becomes a decided help in deciding the best plan to pursue in these often puzzling cases.

I have examined the patient once or twice since and the eye was found normal in every respect. A recent letter from him states that he is able to use his eye comfortably for near work, and his distant vision is clear.

PERIPHERAL COMMUNICATING VESSELS BETWEEN RETINA AND CHOROID. FOLD OF INNER LIMITING MEM- BRANE IN CHORIORETINITIS

MARCUS FEINGOLD, M.D.

NEW ORLEANS, LA.

Four cases of this condition are here reported, with mention of other cases discovered in the literature. The curved line seen in one of these cases is explained as a fold in the limiting membrane, caused by disturbance of the equilibrium in the inner coats of the eye. Presented at the Section on Ophthalmology of the American Medical Association, April, 1920. Released for publication by the Journal of the A. M. A. Color plates of these cases will appear in a subsequent issue.

Patches of extensive pigmentation, and atrophy of choroid and retina resulting from chorioretinitis, are matters of such daily observation in the life of the ophthalmologist that when conditions to be noticed in connection with such patches are recorded only rarely, their scarcity must indeed be concluded therefrom. Still, this very familiarity with these chorioretinitic conditions might possibly lead to a neglect of closer study of the details and to overlooking of changes such as are reported below. In this way, in Case 2, the anomaly was detected only at the second examination. This is especially likely to occur in the cases in which the focus of chorioretinitis is more in the periphery and therefore less accessible to examination. It is for the purpose of directing attention to the very rare and extremely interesting conditions that the subjoined cases are reported.

CASES

CASE 1.—Robert S., aged 14 years, called at the Touro Infirmary Eye Clinic, March 21, 1912, stating that four days before he had been shot in the left eye with some BB shot, that the eye had been inflamed since, and that enucleation had been advised in another hospital. Vision, R. E., 5/5; L. E., doubtful light perception. Left eye: Marked chemosis of the conjunctiva of the eyeball; a small, yellowish linear wound of the cornea near the upper limbus appeared to be superficial only; a 2 mm. hypopyon was present; the iris was discolored and the pupil was filled with exudate; no fundus reflex could be seen. The patient was at once admitted to the infirmary; sodium

salicylat and mercury and potassium iodid were ordered internally, together with hot applications and atropin instillations to the eye. Marked improvement set in, and he could soon leave the hospital with normal vision of the injured eye. Examinations after discharge and since, the last during December, 1919, revealed: Right eye, normal. Left eye: A small linear opacity in the cornea near the upper limbus marks the site of the injury; a fine perforation of the iris and a linear opacity of the lens near the upper margin corresponding to the corneal opacity. The pupil is round and shows no posterior synechiae. The vitreous is clear. The disk is slightly irregular in outline, well defined, and is surrounded by a grayish pigment line at the temporal margin; a small white epipapillary membrane covers some of the lower trunks on the disk. About 3 d.d. vertically above the disk is seen a 1 by $\frac{1}{2}$ d.d. irregularly oblong or rhomboid area of dense black pigment accumulation, surrounded by an irregularly wide and more yellow halo. A branch of the upper temporal artery for the upper fundus coming from below runs thru the halo and touches the pigment area on the temporal side; slight veiling makes the details at this point not very sharp. A vein, almost as wide as the main upper temporal vein on the disk, draining the upper fundus and coming straight downward, approaches the pigmented area from above, advances on it for some distance, and suddenly disappears. No more of it is seen in the pigmented portion, but in the lower part of the yellow halo a fine, white and opaque line appears in its

continuation. In its course downward, this line is gradually getting thinner and less opaque white; a little over 1 d.d. from the halo it merges into a hairline-like vein which, getting thicker and uniting with another fine branch from a more temporal area enters the upper temporal vein about 1 d.d. above the disk (Fig. 1). Vision 5/5. In the field a large sector-like defect begin-

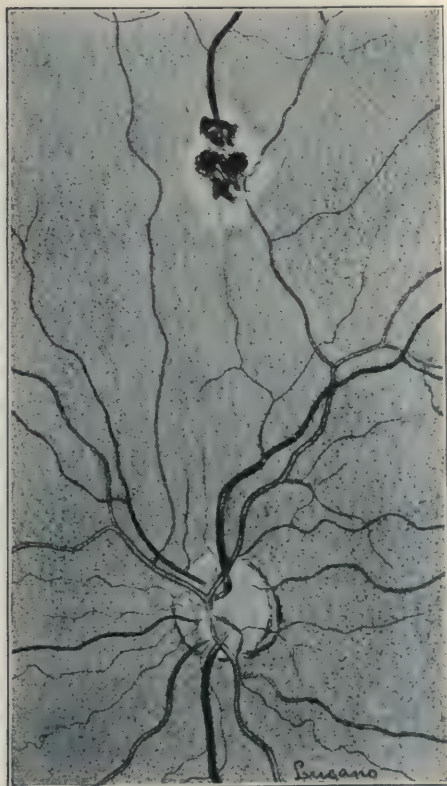


Fig. 1.—(Case 1).—Peripheral communicating vessel between choroid and retina.

ning at the point corresponding to the pigment patch can be made out. Roentgen-ray examination revealed one small bullet in the brow and another one in the orbit, but whether in the eye or outside could not with certainty be established.

CASE 2.—Mrs. T. F., aged 46, called, July 27, 1915, because of headaches and difficulty in seeing at near, telling that she had never worn glasses, that she was being treated by a competent

internist for kidney trouble, and that he had ordered mixed treatment for her some time before. Her son, W. F., came under observation ten years ago for disseminated choroiditis of both eyes which was then considered of syphilitic origin. Retinoscopy under homatropin revealed: R. E. = L. E. $+ 0.50 \text{ C} + 0.50 \text{ c. ax. } 180^\circ$. Vision 5/5 $+$. R. E.: On the disk begins a glassy transparent strand, extending upward and forward into the vitreous for about 5 d.d. About 4 d.d. from the disk along the upper temporal artery is seen an irregular and almost horizontal oval area about 2 by 4 d.d. consisting of a peripheral ringlike and a central oval portion. The peripheral portion is ringlike and contains numerous small and larger, black pigment patches, all lying behind the retinal vessels; between the patches the fundus is slightly more yellowish than around the focus. This peripheral portion encloses the central, irregularly oval and sharply outlined portion in which the fundus appears whitish pink, from atrophy of the choroid and retina; here several convolutions of choroidal vessels can be seen, but the finer details are not distinct. The upper temporal artery and one of its branches pass in front of both the ring and oval portions and are to all appearances unchanged. The upper temporal vein shows on the other hand, the following: From the disk upward, vein and artery are of about the same caliber and remain in close proximity to each other for a distance of about 2.5 d.d.; the vein, which until now ran above the artery, is now crossed by it and lies on the lower side of the artery; continuing in this relation for about $\frac{1}{3}$ d.d. after crossing the vein, makes a sharp rectangular bend downward and now continues in a diagonal direction down and to the temporal side past the macular region. No vein corresponding to the artery is seen on the nasal side of the focus: but on the temporal side, where the upper temporal artery crosses the ringlike pigment area, a large vein of the size of the upper venous trunk on the disk, the result of the union of two

smaller branches coming from the upper temporal periphery, is seen to lie below and parallel with the artery; this vein approaches and then crosses the upper part of the pigment ring and reaches up to the sharp edge of the central oval atrophic area, where nothing further can be seen of it. Not even a threadlike continuation connecting this point with the angular bend of the upper temporal vein after the crossing of the artery can be seen (Fig. 2). The left eye was normal.

CASE 3.—Miss C. A., aged 18 years, born and living in Guatemala, called,

of the macular region an area of intense black pigmentation is found surrounded by a narrow yellow halo, much lighter than the balance of the fundus. Below this one is a round, ringlike patch of black pigment about two-thirds the size of the disk, which is crossed by a branch of the lower temporal artery and surrounded by a narrow halo. Below the macula and to the temporal side of the ringlike pigment deposit are several small pigment accumulations, each surrounded by a narrower or wider yellow atrophic halo. The upper temporal and nasal



Fig. 2.—(Case 2).—Peripheral communicating vessel between choroid and retina.

Nov. 5, 1918, because she had been seeing black spots before both eyes for three months. Both eyes pained, the left one more. Her eye specialist, a well known and able man, had prescribed strychnin and mercury and iodids. Vision, R. E., 5/12; L. E., 3/60. Retinoscopy under homatropin: R. E. — $1.0 \text{ C} + 1.50 \text{ c. ax. } 90^\circ$; L. E. — $1.0 \text{ C} + 0.75 \text{ c. ax. } 90^\circ$. Right eye: The disk is somewhat irregularly outlined, well defined, not elevated, whitish on temporal half and pink in nasal portion. Adjoining the lower nasal margin of the disk the retina is slightly cloudy as if from a thin veil of connective tissue in the here slightly atrophic retina and choroid. In the macular area some disturbance in pigmentation and possibly some increase in pigmentation is seen; the fovea is indistinct. At the upper temporal side

vessels, the lower nasal vessels and the lower temporal artery are apparently normal. The lower temporal vein has apparently the normal thickness on the disk and for about 2 d.d. on its further course up to a point where it receives the first large branch from the lower periphery. From here on it is suddenly disproportionately thin and is wholly made up by the confluence of vessels draining the lower and temporal periphery. A rather large vein coming from the temporal periphery and arriving near the ringlike pigment accumulation makes a slight curve downward and then, almost vertically below the ringlike opacity after an angular bend of about 60 degrees, turns suddenly upward, runs straight up up to the ringlike patch approaching it from below, crosses the lower pigmented portion and abruptly ends

with a small hooklike curve in the yellow center of the ring. An almost imperceptible, thin vessel connects the angular bend of this vein with the lower temporal vein in its thin portion about $\frac{3}{4}$ d.d. to the temporal side of the point of entrance of the above mentioned vein from below. Beginning about 1 d.d. vertically below the center of the disk, a thin, whitish line runs almost parallel with the lower and nasal disk margins; turning to the

they are crossed by it; there is no appreciable parallax (Fig. 3).

Left eye: Vitreous dust and thready opacities make close study of details impossible. The disk is round, the upper and lower margins are not very well defined, not elevated; the disk is possibly paler than the right one; a trace of glassy membrane is found in front of the vessels just below the disk. A focus about two-thirds the size of the disk in the upper part of the macula



Fig. 3.—(Case 3).—Right eye: Peripheral communicating vessel between choroid and retina; fold of inner limiting membrane.

temple it is now a little farther away from the upper margin of the disk and making a spiral-like curve downward, it ends almost in a vertical line with the temporal margin of the disk. The line is thin, whitish, seems to have double contours, does not change position, and has a thin, reddish line of about the same thickness accompanying it. The position of the red line changes from one side of the white line to the other with the change of the light. At times the red line is found on the right side of one portion of the white one and on the left side of the balance of it. White line and its accompanying red one are always in front of the vessels; thru the white line the vessels can be seen whenever

extends upward to a horizontal, undulating and thin vein; it is irregularly round, greenish gray, cloudy, apparently somewhat elevated above the level of the retina, and is surrounded by a narrow yellow halo with small lumps of gray and blackish pigment. From the focus as a center numerous short and longer, radial, very fine, linear and brilliant reflexes extend in the lower half of the macula and also in a nasal direction toward the disk. To the temporal side of this focus are three small round yellow areas of depigmentation with traces of pigment accumulation. About 4 to 5 d.d. to the temporal side of the disk and in a horizontal line with the upper margin of the disk is a triangular, densely

black pigment accumulation surrounded by an irregularly wide yellow halo. Below this focus and almost in a horizontal line with the disk is a $\frac{2}{3}$ d.d. wide, irregularly round dense black pigment accumulation surrounded by an irregularly wide yellow halo. In the lower periphery are seen one or two large yellowish foci of depigmentation with some accumula-

periphery. The customary continuation to the temporal side is absent after the bend. A large wide vein characterized in the periphery by several angular bends (beyond area of the picture), and draining the temporal periphery of the fundus, arrives from the temporal side about 2 d.d. below the pigmented area, makes an angular bend of about 60 degrees, turns up-

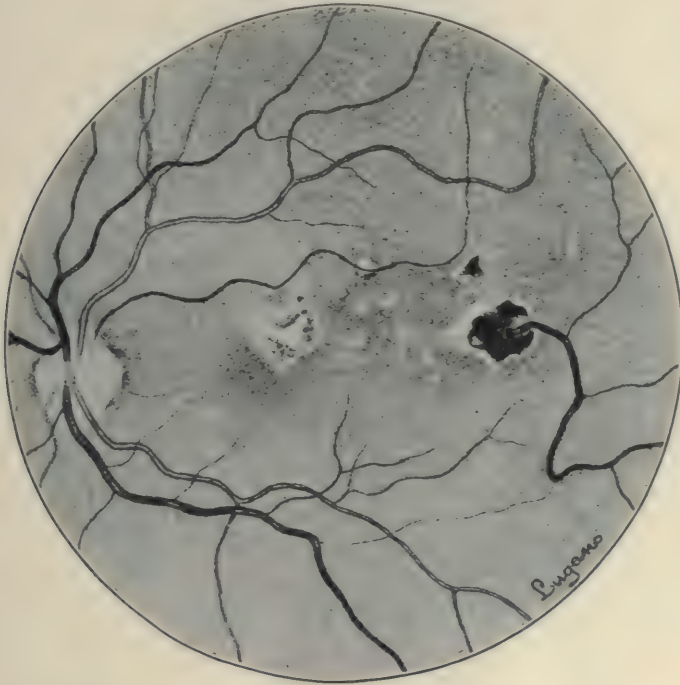


Fig. 4.—(Case 3).—Left eye: peripheral communicating vessel between choroid and retina.

tion of pigment and more extensive atrophy of choroid and retina. The upper vessels, the lower nasal vessels and the lower temporal artery are all normal. The lower temporal vein is normally wide on the disk and continues fairly wide until about vertically below the macular area, where it receives a branch, the result of the confluence of vessels from the macula and from the temporal side of it; for $\frac{1}{2}$ d.d. more the vein continues in this direction, then making an angular bend downward of about 90 degrees it is suddenly much thinner and is now only receiving branches from the lower

ward and then horizontally to the nasal side, approaches the pigment area from the temporal side, and crosses in front of it to the center, where it disappears without any further trace. A small yellow patch of atrophy is seen above the vessel, where it crosses the temporal portion of the pigmented area. A hairlike, irregularly thin vessel running from the sharp bend of this vein connects it with the lower temporal vein at the rectangular bend, where the vessel coming from the lower periphery becomes the lower temporal vein (Fig. 4).

During several weeks of observation

and treatment with mercury and potassium iodid, the left vitreous cleared considerably, the greenish focus in the upper part of the macula became less dense, less elevated, and more white; the radial reflexes in the macula disappeared and atrophy of choroid and retina began to show more clearly at the lower temporal margin (picture

common: In each instance we find an anomalous retinal vein which, draining a part of the periphery of the fundus, fails to continue in its course toward the disk and suddenly disappears in the midst of pigment accumulation as if thru a hole in the retina. These very unusual pathologic vessels, of which only a few examples are on



Fig. 5.—Fold of inner limiting membrane.

was made at this time). The patient finally returned home for further observation and treatment. The field of each eye was irregularly contracted, and the field of the left eye showed a scotoma extending from the fixation point downward from 5 to 10 degrees. Physical examination, including nose, throat and teeth was negative. The Wassermann test was found negative by one examiner, and positive by another. The luetin test was decidedly positive.

COMMENT

With the many differences natural to these cases, all show one thing in

record, are veins which connect the retinal with the choroidal circulation. Communication between the two systems of circulation has been demonstrated by Leber to exist in the normal eye at the disk. Because in these pathologic cases the communication is in the periphery these vessels have been classified as peripheral anastomosis between retinal and choroidal vessels. In his exhaustive monograph on the retina which appeared in 1915, Leber¹, collected from the whole literature five authors reporting such peripheral anastomoses, some venous, some arterial. Since then, Salus² has pub-

lished reports of two cases on two different occasions. A search of the literature has brought to light in addition three plates in Oeller's "Atlas of Rare Ophthalmoscopic Pictures," depicting three instances, in two patients, of active processes in the chorioretina in which the beginning of such peripheral chorioretinal vessels can be seen. These three plates have been overlooked by Leber and Salus. To all these cases must now be added the foregoing four instances discovered in three patients. This series shows, in Case 1, the interesting novelty that such adventitious vascular communication can develop after an injury. Case 3 of this series and Oeller's C. Tab. 3 and 4 are the only instances of a bilateral occurrence of this rare condition.

Leber divides the cases into two groups. In the first group the choroidal vessels enter into visible and wide communication with the normal vessels of the retina. The best example of this group is the case of Lawson⁴; the present series contains no such example. In his second group no such communication exists, and a certain district of the retina is not supplied by the retinal vessels but by vessels entering the retina through a chorioretinal focus. Cases 1 and 2 belong, without question, in the latter class, while Case 3 clearly forms the transition between Leber's two groups, since each eye shows a fine hairlike vessel which connects the normal retinal vein with the pathologic vein draining the blood through the opening into the choroid. For the development of these anastomoses it must be assumed, according to Leber, that after occlusion of the retinal vessels by the disease, vessels from the choroid grow into the retina in places where the tissues have been destroyed by bleeding or inflammation, and we must now add, or by injury. Thus in Case 2 the mechanism is easily understood if we assume that the focus of chorioiditis produced first an obstruction of the vein at the focus and that it soon after gave occasion to ingrowth of a choroidal vein which, communicating

with the thrombosed retinal vein, led to the reestablishing of almost the entire venous circulation in the retina. It is manifest that in this case not even a fine venous thread need mark the course of the original vessel between the focus and the bend in the superior temporal vein. A similar explanation holds for Case 1, and the fine vein in the original course of the vessel below the seat of injury is probably to be explained in such manner that this fine vessel, the remnant of the old vein, actually does not even partially drain the area above the focus, but that the blood it carries is solely derived from fine microscopic and therefore ophthalmoscopically invisible vessels from below the focus and its neighborhood. The peculiar emerging of the fine hairlike vein from the opaque white line would certainly bear out such an assumption.

While Leber's theory certainly holds good for the way the choroidal blood vessels begin to communicate with the retinal vessels in these two cases, it gives no explanation why such vessels will occasionally, in part, or wholly remain in communication with the retinal vessels as in our Case 3 or in the case of Lawson belonging in Group 1. Nor does this theory explain why the blood current should be diverted in the direction opposite to its original course, as happened in Case 3, in each one of the veins from the point where it disappears in the center of the pigmented area up to the point of the angular bend where the fine red line begins.

These difficulties can be explained, tho, if we assume that at the beginning of the chorioretinitis a small particle of the thrombus from the small vessel overlying the focus broke away and, being carried by the blood stream in a central direction toward the disk, was caught and became lodged at that point of the lower temporal vein, which later stood out as the angular bend. Because of anatomic peculiarities, such as narrowness, the size of the angle under which the vein united with the trunk, etc., this point may have been the cause that the small ob-

struction could lodge here and form the beginning of an almost total occlusion of the vein. Further developments, such as organization, canalization, etc., would finally determine whether the blood flow would stop entirely or become more or less entirely restored. While the occlusion at this point was at its height, proliferation of vessels from the choroid in the region of the chorioretinal focus began, and an anastomosis was soon established between the choroidal vessels and the small thrombosed retinal vein. The moment this was accomplished, all the blood dammed up in the peripheral part of the vein, because of the obstruction at the angular bend, began to turn in the the direction of least pressure, utilizing the newly opened path to leave the interior of the eye. In the whole vein the blood used normal paths and ran in the normal direction. Only in that short vessel which begins in the focus and ends at the angular bend of the vein as it arrives from the periphery was the original direction of current reversed by the pushing mass behind it, and the narrow path had to be widened to accommodate all the accumulated blood from this part of the periphery.

While the formation of peripheral anastomoses as here described is a most desirable outcome after chorioretinitis or injury, since it restores the circulation in the affected part of the retina, we have, unfortunately, no hand in determining such a happy result. Of the two factors on which such an outcome primarily depends, the seat of focus or injury and its proximity to the retinal vein and suitable choroidal vessel is manifestly determined before our aid is called into play. But even the other factor—that of establishing the communication if conditions are favorable—is at present outside of the sphere to be influenced by our actions.

FOLD OF MEMBRANE.

The white line running more or less concentrically with the nasal margin of the right disk in Case 3, and the red one accompanying it, though not intended as the main subject of this pa-

per, demand more detailed discussion. No picture reproducing a similar condition could be found in all the available collections of fundus pictures, nor could a description be located in the literature which would correspond to this observation, excepting possibly the changes found by Hudson⁵ after a foreign body injury. This question was especially studied some seven years ago when Mr. W., aged 43, whose right eye had always been bad, presented himself at the office for examination because of difficulty at near vision. As the cause of his difficulties, hypermetropic astigmatism and beginning presbyopia were found, while the cause of the poor vision of the right eye was found in a large area of atrophy of the choroid and retina in the macular region and beyond it, partly laying the sclera bare and containing patches of pigmentation. A similar whitish, more or less circular, incomplete line surrounded, as in Case 3, the disk almost concentrically. This circle was interrupted only below and where it crossed the focus in the macular region. In the upper temporal portion of the ring, a small branch was given off by it. As in Case 3, the whitish line continually kept its position under all conditions of light, allowed the vessels crossed by it to shine thru, and was accompanied by the thin red line which continually changed position with the varying conditions of light (Fig. 5). The patient has remained under observation until the present day, and the position of the line and its accompanying red one have remained unaltered. Close observation at the time of the painting of the picture, and later on with the Gullstrand ophthalmoscope, impressed one with the fact that the line was absolutely fixed in position and, therefore, no reflex. The impression was gradually gained that the white line was entirely the expression of a fold in the inner limiting membrane brought about in some manner by traction or other disturbance of equilibrium in the inner coats of the eye in consequence of the scar in the choroid and retina. The red line, because of its changing relation to the white one, came to be

looked on as purely a shadow at the foot of the white line, which shadow has assumed that peculiar deep red color because of the fundus coloring.

This impression as to the nature of the white and red line has been greatly strengthened during the observation of Case 3.⁷

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A CASE OF OCULAR PEMPHIGUS

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This paper includes with the report of a case a review of the general clinical features of pemphigus and the allied condition known as Duhring's disease. Read before the Section on Ophthalmology, College of Physicians of Philadelphia, Feb. 19, 1920. (See p. 523.)

In October last a colored female, 25 years of age, married, was referred to me in my service at the Howard Hospital, on account of an acute exacerbation of an inflammation of the eyes; which had initiated itself as part of a more or less chronic skin trouble, some three months previously. According to the patient's statement, the latter affection appeared in August of 1918, and took the form of an eruption of small blisters over the chest. Her health was poor at the time; indeed she stated that she had never been robust, and had repeated attacks of pleurisy since she was 15 years of age. For relief of her skin affection she sought the Woman's Hospital, where she came under the care of Dr. Rose Hirschler, whose notes, thanks to Dr. Hirschler's courtesy, are as follows:

"I recall Mrs. P. D. distinctly as an interesting case, however not of pemphigus of the skin but of an allied affection, dermatitis herpetiformis or Duhring's disease. I recollect her very well as having recurrent attacks of the vesicular eruption, quite typical in type, but growing more severe as time passed, particularly as it affected her

general physical condition. She had never a typical pemphigoid eruption, as dermatologists call pemphigus. She had, however, vesicles on the mucous membranes of the mouth, nose, and even as I recall it, small ones on the inside of her lower eye lids. So I suppose that possibly you are looking at an exaggerated attack of not pemphigus, but its cousin, Duhring's disease.

During each attack the rash cleared under the use of some form of arsenic, Fowler's drops having been the most efficient. Our clinic, as all others during the war times, was too poor to supply hypodermics of cacodylat of soda, so that was not used. I believe that at my exodus from the clinic last year, Mrs. D. was in the throes of her fifth or sixth attack, which was a generalized, typical severe attack of the disease. She has always been, as I knew her, a thin, undernourished female, about in her middle twenties and a rather intelligent mulatto. She had no family history of any similar or allied skin affection and seems to be simply a law unto herself in that she is the only one so afflicted in the family."

After passing from Dr. Hirschler's

observation, at the end of a year the patient consulted other practitioners in private, but with indifferent success, as fresh crops of blisters manifested themselves, their appearance being preceded by severe localized pains over the surface of the chest and face, like bee stings. The eyes also became affected, smarting and watering and sensitive to light. Another change of medical advisers seemed desirable and she became a patient in the Dermatological and Ophthalmological Depts. of the Hahnemann Hospital. Apparently there was nothing in the ocular condition at that time to attract particular attention, the notes of the eye clinic which she visited a few times reading "phlyctenular conjunctivitis; treatment, boric acid and argyrol." I am indebted to Dr. Ralph Bernstein for a fuller account of the condition of her skin.

"Mrs. P. D., colored, married, age 25 years came to Dermatological Dispensary August 11, 1919, with a history of an eruption involving the arms, face, body, neck, mouth and eyes, which she had had for several years and claimed to have been treated at several other hospital dispensaries thruout the city without result. The eruption itched intensely all the time, preventing to a great extent the patient's sleep. There was decided lachrimation and photophobia. The condition of the mouth prevented proper mastication of solid food, nevertheless the patient seemed to be in fair condition generally.

The eruption consisted of groups of papules and vesicles with secondary small ulcerations, crusts and pigmented scars, following the scratching, from which the patient seemed unable to abstain. The lesions were mounted on an erythematous base.

Altho the patient denied all history of syphilis and gave a history of several negative Wassermanns, she was placed under antisyphilitic treatment for a short period without benefit. The diagnosis of dermatitis herpetiformis was made and the patient treated with an emulsion of olive oil containing camphor and chloral and given croton

tig, 12x. In three days she returned and altho the emulsion relieved to a certain extent the itching the number of lesions still increased and the lachrimation and photophobia were more marked. Croton tig. 30x was prescribed, the olive oil emulsion continued and the patient referred to the Eye Dispensary. After three days the patient again returned with the number of lesions still increasing and the eye symptoms more marked. Croton tig 200x was prescribed. Since November 10, she returned to the Dispensary at irregular intervals showing at times some improvement and at others none. We have no record of the treatment given by the eye department.

At her last visit the eruption involving the mucous membrane of the mouth and lips was improved, the eruption on the skin was unimproved and the eyes unimproved."

When the patient first came to the Howard Hospital, Oct. 15, 1919, there was some photophobia with a rather marked tendency to blepharospasm. Examination showed a series of a dozen or more small bullae, dotted here and there upon the lids and over the skin of the face. The corneas of both eyes were clear, but the conjunctiva was red and injected, especially below, and involved in a series of irregularly rounded grey areas. The ciliary margins of both lids, but especially of the lower, were incurved and the cilia were in apposition with the globe. There was considerable lachrimation but no other discharge. Despite epilation, the administration of atropin and soothing collyria and general treatment, the symptoms rapidly progressed; the lower cul-de-sacs growing markedly shallower, in consequence of an agglutination of the inflamed bullae and palpebral portions of the conjunctiva. Both corneas became hazy, infiltrated and superficially vascular, the invasion starting at the periphery, and rapidly extending towards the centre of the membrane. Vision, which equalled 5/9 in the right eye and 5/12 in the left eye at the first examination, sank rapidly; so that at

the end of six weeks, it equalled counting fingers merely.

A searching examination of her general condition, which was made while she was in the hospital, and a few weeks later by Dr. G. M. Piersol, who saw the case in consultation, failed to reveal any gross abnormality, except a general asthenia and evidences of an old consolidated area at the apex of one of the lungs. A Wassermann was negative. As the patient became homesick in the hospital wards, she has been treated as an ambulant, her general condition of inanition and malaise remaining apparently stationary. The conjunctivas are now rapidly shrinking, shallowing the cul-de-sacs more and more; tho the corneal haze seems slightly regressive.

Stelwagon defined pemphigus as "an acute or chronic bullous disease, characterized by the formation of scanty or numerous irregularly scattered variously sized, rounded or oval blebs, arising from apparently normal or moderately reddened skin, and which may or may not be accompanied by mild or severe constitutional disturbance."

Pemphigus of the eye is a rare disease. Although observed more frequently in Europe, it is not seen more than once in 500 cases of skin disease in this country and in England. Hebra did not meet with one instance of ocular involvement in 200 cases of pemphigus of the body, which had been under his care. That the disease is a rare one in eye clinics the following figures show. Thus Santos Fernandez, of Cuba, saw but three cases among 50,000 patients; in Germany, Pergens, two cases among 22,000, Franke 5 among 45,000 and Homer 3 in 70,000. I estimate that during the past 28 years, I have observed approximately 75,000 cases, and the reported case is the first one which has come under my personal care.

Quoting Chance's excellent resumé, in the American Encyclopedia of Ophthalmology, Vol. XII—"There seems to be no constant relation between the duration of the skin affection and the development of the ocular lesions, yet,

in some cases only a few weeks have been known to elapse between the time of the first appearance of the bullae on the skin and the implication of the conjunctiva. In other cases it may be presumed that the association has been closer still, inasmuch as the lesions of the skin or mucous membranes may have been absent for a time or they may have been overlooked, and in this regard it can not be too strongly emphasized that without coincident pemphigus of the integument a positive diagnosis of ocular pemphigus cannot be made. The affection may have begun as a general pemphigus but the conjunctiva may not have been attacked for some years later; so too, it has been known to arise primarily on the conjunctiva, and later involve the skin. No instances have been reported of conjunctival lesions in acute pemphigus. The symptoms of the disease of the conjunctiva, just as in the dermal manifestations depend for their severity upon the extent or depth to which the membranes are invaded."

Females are more predisposed to the disease and it is more frequent in the young than in adults. Stelwagon says it is probable that the several so called varieties of pemphigus are due to different causes, or perhaps the ingrafting of an accidental factor upon the same disease process. There seems to be some association of the disease with animals or their product as a frequent source. Stelwagon thought that in many such cases the underlying factor is a streptococcic infection. He believed also that a derangement of the nervous system, either by direct action or merely contributory to a successful parasitic invasion or infection, is of etiologic importance. He was furthermore of the opinion that the cutaneous manifestations are but a part of a systemic process or infection, as pathologic studies show organic changes in other organs and structures. Altho pemphigus occurs in syphilitics, syphilis is not an etiologic factor in all cases.

In Parsons' Pathology of the Eye will be found the following: "One of the earliest cases of pemphigus of the conjunctiva was published by White

Cooper (1858); before that date—and since also—it has been confused with xerosis. It was described as *syndesmitis degenerativa* by Stellwag (1870), and as *essential shrinking of the conjunctiva* by Kries (1878), of von Graefe's clinic. Von Graefe (1879) propounded the identity of pemphigus and essential shrinking, whilst Becker (1879) admitted only the identity of the latter with syndesmitis. v. Graefe's view is now generally admitted (Fuchs and others)."

As may be gathered from the foregoing, the prognosis for sight is extremely bad, total or almost total loss of vision intervening more or less rapidly. Not unfortunately, in view of the visual condition and general asthenia, death frequently intervenes shortly after the mucous membranes of the eyes and mouth become involved.

Local treatment is of course merely palliative. In cases where the conjunctival affection is not so actively progressive, transplantation of skin or mucous membrane, into the cul-de-sacs, may be essayed, with some hope of partial relief. Generally, arsenic, quinin and strychnia, and particularly the former, are of most service.

It will be noted that in reporting and considering the case as one of ocular pemphigus, I have ignored the diagnosis of both Drs. Hirschler and Bernstein, who differentiated the case as Duhring's disease. This variety of

skin affection being, however, so closely related to pemphigus, the points of difference between the two being largely academic, it seems best to record the case under the more familiar and comprehensive disease. It may not be without interest, however, to state in this connection that Stelwag defines Duhring's disease as follows: "Duhring's disease or dermatitis herpetiformis is a rare inflammatory disease, with or without slight or grave systemic disturbance, characterized by an eruption of an erythematous, papular, vesicular, pustular, bullous or mixed type, with a decided tendency toward grouping, accompanied usually by intense itching and burning sensations, with more or less consequent pigmentation, and pursuing a persistent, chronic course with exacerbations."

He says that pemphigus differs from the bullous type of dermatitis herpetiformis in that the lesions of the former are usually larger and show no special tendency to occur in groups or to assume irregular angular or multiform shapes, etc. The constitutional symptoms of Duhring's disease are, as a rule, not nearly so marked as in pemphigus. A fatal ending is possible in the grave cases, tho the disease usually persists for years without compromising life; and in many patients the general health, considering the violence of the of the eruptive phenomena, remains comparatively undisturbed.

NOTES, CASES AND INSTRUMENTS

UNILATERAL BLINDNESS (WAR TRAUMATISM) FOLLOWED LATER BY BLINDNESS IN FELLOW EYE

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Read before the Section on Ophthalmology, College of Physicians, Philadelphia, February 19, 1920. For discussion, see p. 522.

While fighting at Soissons, France, in July, 1918, James D., age 22, received a shrapnel wound about the junction of the parietal and temporal bones on the right side. He was taken to a hospital, the right eye operated on, possibly a conjunctival flap, and both eyes bandaged for several days. Upon removing the bandage the right eye was found to be blind, and has remained blind without any return of even light perception. The left eye was uninjured and its vision unimpaired. He has been interned in a hospital at Coblenz, a hospital at Bordeaux and the hospitals of three camps in the United States. He was admitted to the Jefferson Hospital, January, 1920. From April 19th, 1919, he has been employed as an automobile truck driver. He stated since his return to the United States, that he has suffered from headache and pain in the eyes.

The day before admission he was in his usual health, and on the following morning, when he awoke he found to his dismay, he was completely blind in the left eye. The only ocular lesions discoverable were in the right eye, and consisted of an irregularity or thickening of the corneal limbus down and out without real opacity or material change in the corneal structure. The media are clear. There is one posterior synechia. In the fundus below the disc are two parallel, almost straight lines of rupture, not crescentic with either the fovea or the optic disc, and about three disc diameters in length. No hemorrhages or traces of previous extravasations, or pigment changes unconnected with a cicatricial

line of rupture; no yellowish dots of exudation, and no retinal folds or wrinkles in the foveal region are present. The vascularity of the optic disc and retina is good, and there is no indication of incipient atrophy of either tissue.

It is plainly evident therefore, that the fundus picture of the right eye afforded no explanation of the total blindness. The left eye was normal in every respect. Both pupils respond to light and consensually. The excursions of the iris were not extensive, but contraction upon exposure was undoubtedly present, indicating that if a cerebral lesion existed, its location must be posterior to the basic centers.

With the exception of blindness, the patient seemed to be in good health. True, he had exaggerated knee jerks, a trifle more pronounced on the left side, but neither Dr. Dercum or Dr. Gilpin had been able to find any disease of the nervous system. The throat, nose, sinuses and teeth are healthy, and the organs of the abdomen and chest performed their functions properly. Urinalysis is negative. Dr. Manges by means of the X-ray, eliminated fracture of the skull, changes in the bony structure and cerebral growth. The only important guideposts toward arriving at a diagnosis were the complete blindness of the right eye, immediately following a wound in the right temple and persistent for 18 months, sudden and total loss of vision of the left eye 16 months after injury, and the negative results of an exhaustive physical examination.

Three possibilities suggest themselves: Are we dealing with a case of

organic disease of the brain, a case of hysteria or a case of malingering? The last hypothesis cannot be supported by any of our observations, and may be dismissed in a few words. Binocular feigned blindness is extremely rare. It may be assumed because of desire for sympathy, for relief for some pending duty, for compensation, or may be regarded as an eccentricity of a disordered brain. The patient does not suggest such a condition with the exception of one point. The government allowed a pension of \$30.00 per month until recently, when the amount was cut to \$3.00. Just what relation the reduction bears to the time when he claims he became blind in the left eye is unknown. His manner of looking, his efforts to see, his collision with objects in the room, and his general behavior are positive protests against the diagnosis of malingering.

While I am inclined to attribute the symptoms to organic central disease, my reasons are not convincing, even to myself. It must be remembered, that simultaneously with the shrapnel wound in the forehead, the right eye suffered a double injury, one to the corneal limbus and one to the fundus. The exact nature of the former may only be surmised but probably consisted of a tear, or cut which was operated on with satisfactory results. The double rupture of the choroid is proof of a severe concussion. Neither of the injuries explains the complete and permanent blindness of that eye; and since the ophthalmoscope shows undisturbed circulation in the nerve head and retina, atrophy of the nerve, a lesion that might have been expected, may be positively excluded. The sudden and complete blindness of the left eye, many months later, is unexplainable on the basis of ocular lesions.

The recovery of light perception first in the temporal field, then in the entire peripheral field and finally a partial recovery in the central field with retention of pupillary response to light, thruout the period of observation,

points to a lesion of the higher centers. His attack of mental depression, lasting two or three days during which his indifference to life leading to thoughts, if not attempts of suicide, indicate also derangement of the cortical centre. The character and extent of this lesion, if lesion there be, are conjectural. Microscopically small changes could not explain the blindness. Gross alteration in the brain caused by hemorrhages, embolism or softening would certainly be indicated by other and more symptoms than those suffered by this patient.

This case bears no resemblance to the few cases of transient blindness from concussion reported by Lemier (*Ann. d'Oculist*, v. 155, p. 108) and Bussy (*ibid* Page 423) abstracted in the *Oph. Y. B.* (*Amer. J. Oph.*, Oct. 1919). The blindness was attributed, by the former, to vasomotor disturbance of the occipital lobes, and by the latter, to vasomotor disturbance, dependent upon a retinal anemia and shock to the sympathetic nerve system. In de Schweinitz's interesting paper published in the *AMERICAN JOURNAL OF OPHTHALMOLOGY*, May, 1919, Lagrange (*Atlas d'Opht. de Guerre*) is quoted as having occasionally noted defective vision, central scotoma, and no evidence of ophthalmoscopic changes in the macula. De Schweinitz remarks: "This I have not observed, but I have seen a fundus free from pathologic signs, except a delicate stippling of the macula and a minute Y-shaped choroidal rupture." In favor of the diagnosis of hysteria may be stated, blindness without ophthalmoscopic changes, and without intermission, pupillary reflexes, exaggerated knee jerks, the absence of physical cause as shown by the examination of all the functions, and the hope of more substantial recognition by the government of his sacrifices.

Vision today, 2, 18, 20, R. 1. p., L. 6/30. Field partly limited except to temporal side. Color perception only at fixation point.

EMBOLISM OF CENTRAL ARTERY OF RETINA. RESTORATION BY FORCIBLE MASSAGE.

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Sudden blindness due to true embolism of the retinal artery is an extremely rare occurrence, whereas thrombosis is relatively more common, tho indeed the latter is seldom seen. The former is due to a blood clot, fibrin, or other foreign body being carried from the main arterial stream to the terminal artery of the eye and is usually

who had been treated by this method which has been generally adopted. Doubtless there are a number of cases not published and a few more on record. I have seen several more, but as they are not particularly pertinent to this article, report only the one which follows:

N. E. J., aged 70, consulted me about 3:00 P. M., Sept. 2, 1919, stating that he had become suddenly blind in right eye since morning. He had several spells of clouding before the eye during three months, but this time the clouding did not disappear. He is under treatment with Dr. Heussy for arteriosclerosis, enlargement of the

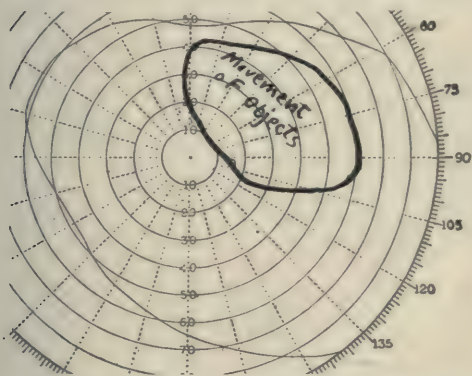


Fig. 1—Field of vision when patient was first seen. Movement of large objects perceived in part of upper temporal field.

associated with cardiac disease. The latter is due to inflammatory degeneration of the walls of the artery associated with renal and arterial degeneration. Neither of these conditions is amenable to treatment after they have existed for some days, but if seen early, the corking of the vessel may be sufficiently removed to permit of a partial or complete flow of the blood stream, and in either condition the nourishment of the retina may be restored and its vitality insured with return of the function of sight.

In 1899 it was found by Casey Wood,¹ that the clot could be dislodged in some cases by deep digital massage and the sight thereby returned. This was substantiated by me in the report of two cases,² and later by the report of ten from the literature with two more of my own,³ making fifteen to that date,

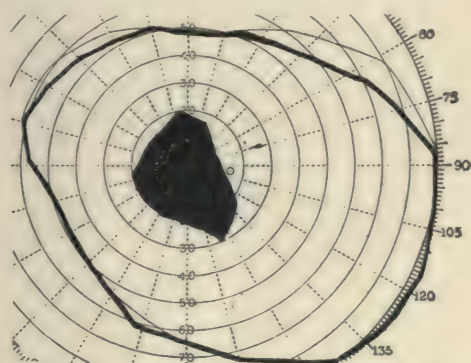


Fig. 2—Field of vision on second day. Outer limits for form restored, large central scotoma.

heart and renal disease, none of which are marked.

Upon examination he could see movement of large objects to right with right eye; left eye was normal in every respect. Ophthalmoscopic examination showed the disc blanched and the arteries and veins nearly empty of blood. Sufficient time not having elapsed to produce edema of the retina, the typical cherry red spot in the macula was not seen. Pupil of right eye showed no reaction to light but contracted to accommodation. B. P. 210 systolic; 110 diastolic. Physical examination of the heart showed it to be somewhat enlarged with snappy sound of aortic valves.

Immediate deep digital massage followed by suction massage with the pneumatic pump used during a period of one-half hour; frequent observa-

tions being made with the ophthalmoscope and at the end of that time it was found that the disc reddened, both arteries and veins filled and the sight came back to the perception of objects in the whole field. On the next day the visual field was full with the exception of an absolute central scotoma of nearly twenty degrees; fourteen days later the scotoma had

The patient remained under dietetic treatment and took small doses of iodid of soda; four massage treatments were given and about twelve of high frequency electricity, the latter incidental to the various examinations, rather than in the hope of improvement therefrom.

This case is reported for the reason that I had never before seen one so

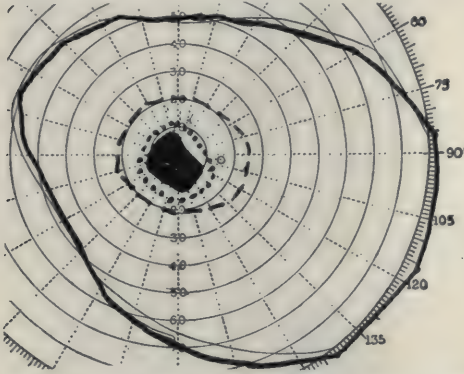


Fig. 3—Obstruction of central retinal artery. Field of vision on fourteenth day. Field for red broken line; green dotted line. Central scotoma smaller.

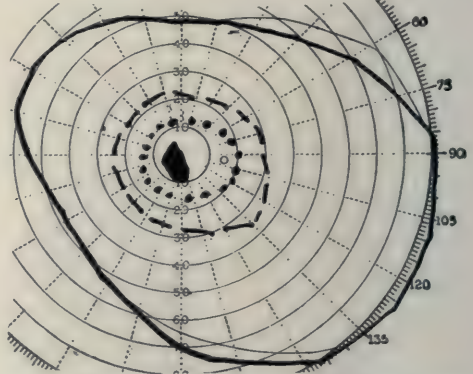


Fig. 4—Field of vision at end of two months. Small central scotoma. Fields for red and green slightly larger.

shrunk to ten degrees with restoration of colors and visual acuity of 6/60 when the patient looked slightly to one side and the fundus appeared normal with normal pupillary reaction.

At the last observation two months later the visual acuity remained the same, the fundus appeared normal and the central scotoma was slightly reduced.

soon after the sudden blindness, as well as to show the course under this form of treatment.

REFERENCES

1. Wood. *Ophth. Rec.*, June, 1899, p. 272.
2. Würdemann. *Ann. of Ophth.*, Oct., 1901. p. 582.
3. Würdemann. *Amer. Jour. Ophth.*, Jan., 1906.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

ROYAL SOCIETY OF MEDICINE.

Section of Ophthalmology.

March 3, 1920.

MR. W. T. HOLMES SPICER, President.

Iridotomy in Immature Cataract.

Mr. J. H. Parsons showed a case in which he performed iridotomy. The patient came with immature cataract, in which the opacity was chiefly in the posterior cortex. He did the ordinary extraction, with a peripheral button-hole, a simple extraction first, then made a tiny hole in the periphery of the iris afterwards. The patient did well, going out with the eye quiet in ten days. A week later, however, she returned with a hypopyon and a flaring iritis, which he regarded as due to endogenous infection.

He took her in, and treated her in the usual way, but, in spite of atropin and hot bathing, the pupil became very small, and eventually blocked. He described by means of a drawing the method in which he did the iridotomy, namely, puncturing the iris and passing a Tyrrell's hook in behind the iris, with the idea of coming out of the tiny coloboma at the top. There was a breach of iris, and she was left with an artificial pupil below, which looked like an ordinary pupil. She was left with slight vitreous opacities, but, with correction, her vision was 6/18.

Several members discussed the case.

Mr. Parsons also showed a case of extraction of a dislocated lens.

Vestibular Nystagmus.

MR. LESLIE PATON exhibited a patient who came to hospital with certain visual defects but whom he was showing because of an extremely readily excited vestibular nystagmus: it was brought on by the mere pressing of cotton wool into the ear.

Blue Dotted Cataract.

Mr. Paton also showed a case of cataract. He had previously had a

similar case. The vision in these cases was usually very little interfered with, and the ophthalmoscope revealed, in this patient, very little opacity. With correction, the vision was 6/12 in one eye, 6/9 in the other. All, including Lord Rayleigh, seemed to agree that the blue color was not due to the presence of pigment, but to a refractive peculiarity.

DISCUSSION.—Mr. Charles Wray said there was a family history of the condition in several of the cases.

Mr. Bishop Harman referred to two cases in which there was an association of this peculiarity with night blindness. Mr. Treacher Collins and Mr. Ernest Clarke also referred to similar cases.

Other cases included one by Mr. Leslie Paton, mass of connective tissue covering the disc, Mr. M. S. Mayou, gummata of eyelid.

Aniridia and Glaucoma.

MR. W. H. McMULLEN showed a case of congenital aniridia, which was associated with some signs of glaucoma. From the momentary view of the discs which was possible, they seemed to be definitely cupped, and palpation seemed to indicate a raised intraocular tension. He raised the question whether trephining should be done, or some other form of operation with the object of allaying irritation. Or should one wait and note what happened?

DISCUSSION.—Mr. Bishop Harman suggested it might be well to try cyclo-dialysis for the separation of the ciliary body: the results of this in Vienna had been declared to be satisfactory, and it was said to produce the least interference in an eye in regard to which one was doubtful whether any interference should be undertaken.

Mr. Frank Juler suggested that a trephine operation might be dangerous in this case, as there must be very little iris tissue left, and in making a trephine hole into the anterior chamber

one was apt to wound the lens. He spoke with knowledge of a case in which he saw disastrous results.

Mr. M. S. Mayou said he had trephined a case of aniridia, and it was satisfactory.

Cyst of Lacrimal Gland.

MR. McMULLEN also showed a case of cyst in the outer part of the orbital margin of the left eye. He believed it to be a cyst of the orbital portion of the lacrimal gland: it was adherent to the roof of the orbit, and only loosely attached to the tarsus. It did not present behind the lid, as did the ordinary lacrimal cyst.

DISCUSSION.—Mr. Treacher Collins said a feature which helped to confirm the diagnosis of cyst of the lacrimal gland was, that when the patient went out into the cold wind the cyst became bigger.

Sir William Lister spoke of a case in his experience in which a cyst of the lacrimal gland went behind the globe. The boy had proptosis of the left eye, which got worse, and the eye was pushed downwards and inwards. He did Krönlein's operation, and after cutting thru the periosteum and separating the orbital fat, he encountered a very black tumor, and in proceeding to separate this, it suddenly burst in his face, and the contents practically disappeared. He feared infection at the time, as the lad had somewhat severe acne of the face. But it healed up by first intention, and the vision—which had gone down to 6/24, with contraction of the field was 6/6.

Mr. Charles Wray suggested that the cyst should first be punctured; as that would greatly facilitate its dissection.

Mr. Jeremy said he had removed a cyst from the inner side of the upper lid, and it was found to be lined with squamous epithelium and contained mucus. He thought it was a transplantation cyst, and suggested that was the nature of Mr. McMullens.

Mr. Leslie Paton discouraged preliminary puncture of the cyst as it might be a cyst of Krause's gland.

A New Test of Color Vision.

Dr. Edridge-Green exhibited, by

means of epidiascope, a series of cards designed to test various forms of color vision defect. The basic idea was a large number of fancy forms which could not be described or memorized by the person submitting to the test, and these were, in succeeding cards, colored in various ways, and large designs wrought in one color with a varying background. He had not known this test to fail in any single case.

DISCUSSION.—Mr. J. H. Parsons pointed out the great difficulty of ensuring that every test-set bore identical shades of color: that had been found to be a real drawback in all the published tests. Not only did different editions of the prints vary, but copies of the same edition did so, no doubt largely due to the fact that anilin dyes faded, and the progressive penetration of the color into the lithographic stone.

Cobalt Glass in Detecting Astigmatism.

Mr. Leslie Paton read a note on the use of cobalt glass in testing for errors of refraction, especially small errors in astigmatism, his object being to refresh memories of the use of this glass for the purpose. He gave a demonstration.

In the discussion it was stated that there was likely to be unnecessary trouble in testing if this were employed, as patients would worry unnecessarily over quite trivial errors and bother the ophthalmologist accordingly.

Treatment of Prolapsed Iris Following Perforating Wounds.

Mr. Charles Goulden read a paper entitled "The Treatment of Prolapse of the Iris Following Accidental Perforating Wounds: with a Note on the Removal of Nonmagnetic Foreign Bodies from the Anterior Chamber." He said attempts at reposition of the prolapsed iris should be avoided, owing to the risk of infection of the anterior chamber of the eye, and because such replaced iris would again relapse. The patient should not be left with the iris incarcerated, otherwise there would either be delayed healing of the wound, or a weak scar which might bulge un-

der intraocular pressure, or defective vision due to displacement of the pupil, and irregular refraction of the cornea, iridocyclitis, or sympathetic iridocyclitis. If several days had elapsed since the wound was received, the case became much more difficult to deal with. Still, cases could be operated upon and the wound freed from uvea as late as ten days after the accident.

The author proceeded to detail the measures he employed in each type of case, which a condensed report without diagrams could not do justice to.

The paper was very appreciatively discussed by several members.

H. DICKINSON.

ST. LOUIS OPHTHALMIC CONFERENCE.

Meeting February 13, 1920.

DR. H. D. LAMB, presiding.

Heterophoria.

DR. WM. F. HARDY stated: Orthophoria has been defined as the condition of perfect ocular muscle balance and heterophoria as any deviation from that ideal state. While the majority of ophthalmologists systematically test the balance of the ocular muscles, the practice is not as general as it should be. The oculist who prescribes the first glasses is always at some disadvantage. He who prescribes later for the same patient has some advantage over his predecessor. Apparently correct lenses, which have been worn conscientiously without relief, should always awaken the suspicion of some muscular anomaly. It should not be forgotten that small imbalances may be the result of spasm, especially when the general muscular tone is not up to the standard: with an improvement in muscular tone, the phoria often disappears. A heterophoria may not become apparent until after some accident or debilitating illness. Uncorrected, a heterophoria of considerable degree means a continuous expenditure of nervous energy. This may mean nothing to a phlegmatic person, but to a high strung individual, it may mean torture. There is a large number of

patients who possess orthophoria for distance and an unusual amount of exophoria for near. Many times this exophoria reaches eight, ten or twelve degrees or more; an imbalance due, in most cases, to weak interni rather than to over active externi. Convergence excess, it may be repeated, is, as a rule, accommodative. Divergence insufficiently generally is secondary to a progressive convergence excess. The convergent tendencies are in the ascendance in youth and the divergent tendencies in adult life. Convergence insufficiency frequently is accommodative and is met with, for example, in uncorrected myopes and in presbyopes who are wearing their first reading glasses. A careful search should be made for even small vertical errors. Among the difficult cases to handle are those with hyperopia and an exophoria, either for distance or near. Correction of the refractive error adds to the exophoria.

Many ophthalmologists are averse to the use of prisms in lateral phorias or openly condemn them, reserving their use for the vertical phorias. It is my personal belief, however, and in agreement with Posey, that prisms, bases in, should be prescribed for patients wearing reading glasses and showing a marked exophoria for near. Especially is this so when asthenopic symptoms persist in spite of an apparently correct presbyopic correction. Prism exercises are chiefly used to strengthen interni where latent outward deviations exist. During their use the action of the interni is enhanced, but whether a permanent result is obtained has always been a mooted question with the writer. Why should ocular muscles increase in tone and development as a result of temporary exercise? This is not true of other muscles of the body. Where the muscle weakness is due to some local or general debilitating cause, exercises may bring about a permanent result.

The longer one practices ophthalmology the more one is impressed with the fact that the best interests of the patient are conserved by a less frequent resort to operations. This is

true in general, but more particularly so in muscular anomalies. In muscle imbalance Reber has contended that if used conservatively, prism corrections ought to be of service in 75% of all cases and that tenotomy should be the last resort. Furthermore, that if properly studied and treated, not more than 2% to 4% of all cases should come to operation.

It is always advisable to prescribe vertical prisms less than the total amount of hyperphoria. In exophoria Posey finds prisms, bases in, of value, correcting one-third or one-fourth of the muscle error, combined with the ametropic correction, for near work.

A good working rule furnished us in correcting ametropia, associated with heterophoria, is to fully correct a hyperopia with convergence excess but in convergence insufficiency to correct only as much hyperopia as is demanded by the age of the patient and his occupation. In myopia, with convergence insufficiency, fully correct the myopia, but with convergence excess undercorrect the myopia.

Many oculists insist upon a knowledge of the muscle balance both for distance and near. Some go to the extreme in the correction of the revealed deviations. Their correction seems called for only when of a pronounced degree or when, after most careful testing and correction of the ametropia with spheres and cylinders, asthenopic symptoms persist.

DISCUSSION.—Dr. E. H. Higbee—There are a great number of muscle tests, all of more or less merit, but the one that has given me the most satisfaction is the one in which the Cogan Chart is used. We often find that the balance is not exactly in the horizontal or vertical meridian. In making muscle tests I always have the patient rested and make no other test that day. We all know that the results following correction of muscle imbalance are not very satisfactory. It is always a question how strong a prism to use. I have tried to keep within the four degrees recommended by the best authorities; if the patient requires more than four

degrees, I believe that a muscle operation is indicated.

CASE 1.—This patient had had all varieties of treatment, such as muscle operations, cycloplegics, complete rest, prisms and exercises, none of which had given him permanent relief. Upon examination I found, by the Cogan Chart, that the displacement was eight degrees, axis eighty. I divided this and put four degrees over each eye and had the prisms ground into his correction, which was a compound astigmatism. This was five years ago and I have seen the patient at least once a year since then. He still continues to wear the same correction and states that he experiences no discomfort whatever and is able to use his eyes for close work as long a time as he wishes.

CASE 2.—This patient was corrected with an eight degree prism at axis 25°. A young broker, had gone the rounds of all the specialists; suffered with intense headaches and backaches, and was wearing at the time I saw him, a corset for the relief of sacro-iliac disturbance. Altho he had a very low refractive error (R + 0.25 cylinder, axis 30° L + 0.37 cylinder axis 180°) he constantly complained of fatigue of the head and eyes. With this correction and the prisms ground in he has had entire relief for the past three months.

CASE 3.—A dentist. Was wearing R + 0.75 \ominus — 2.75 cy. 180° and L + 0.50 \ominus — 2.25 cy 180°. His displacement was corrected with 10 degree prism, axis 10°. I ordered four degrees over each eye. After wearing this correction he remarked, "I have not had so much relief in my life and feel like a different man." He still continues to wear these lenses and they were prescribed five months ago.

Dr. W. H. Luedde.—In recording deviation, the use of the term "degrees" may refer to the arc of ocular deviation or the degree of the prism angle used for its correction. The amount of deviation produced by a prism equals practically one-half of the angle of its surfaces. A prism is usually designated by degrees show-

ing the angle of its surfaces. Landolt has for many years contended that this confusion should be eliminated by adopting the angle of deviation as the basis for uniform notation. If Landolt's method were adopted the prism used to correct deviation should correspond in degrees to the deviation as measured on the screen by circles or points indicating a tangent of one or more degrees at a fixed distance.

Dr. J. W. Charles.—When the patient says that the line of the Maddox Rod is to the right of the light and we use the rotating prism and ask him when it comes on the light, we can readily get the measurement without confusing the patient. I must say, however, that the measurements for near, with most patients, are difficult. I have the instrument "Maddox Near Vision Phorometer" with red dotted line and green numbers, each number corresponding to a degree and I find that patients are very readily confused and seem to have a tendency, when they begin to employ near vision, to use the interni too much. I find a good deal of variation in these tests, where I don't find them in distance tests. I think the remedy for that is to repeat them several times when the patient is rested.

Dr. John Green, Jr.—Dr. Marlow has made some observations on the effect of prolonged covering of one eye on the degree of imbalance. Not rarely he found that the degree of heterophoria (lateral or vertical) was much greater than the original reading. The occlusion of one eye was sometimes kept up for days. It has always been an interesting question how best to manage those cases, in presbyopes, which show orthophoria or slight esophoria for distance and a good deal of exophoria (8° to 10°) for near. In such cases I have not hesitated to give prisms, bases in, incorporated in the reading glass, the prismatic strength being from one-half to two-thirds the total deviation as measured by Maddox Rod Screen Test for near. In vertical deviation of over 5° I believe that a graduated tenotomy or a carefully planned advancement of the ver-

tical recti is indicated. I have been impressed with Dr. Theobald's contention that it is very necessary to make an estimate of the vertical balance for near, as well as for distance. Not infrequently you will find that the two are not identical. I am not convinced that it is always wise, in the event of a low degree of vertical imbalance for near, where there is no vertical imbalance for distance, to incorporate prisms in your correction, at least until the patient has given the correcting lenses a fair trial.

Dr. F. E. Woodruff.—I am convinced that the first thing necessary is to determine the refraction under cycloplegia, in order to get an accurate measurement of the distance correction. After that is done, and the patient has worn a proper correction for distance for some time, then the measurement of the heterophoria may be made and proper prism correction ordered. Another necessity is that the glasses be properly centered. If the pupillary distance is slightly incorrect, it is not possible to get the proper prism effect. The means I consider most convenient for measuring heterophoria for near are Stevenson's and Walton's tests.

Dr. E. C. Spitz.—In all cases I think the muscle test should be taken a number of times very carefully. I always take it at least twice in each case and refer to the measurement afterwards before making any change in the lenses. In the matter of small vertical deviations I find that they are usually overcome by thoroly correcting the refraction. Exophoria is usually reduced by giving full myopic correction. The prisms of Landolt, referred to by Dr. Luedde, are made to measure degrees of deviation. I use the ordinary prisms of the test case and record the findings in degrees as measured by these prisms.

Dr. M. H. Post.—If you use the Maddox Rod test before you have made correction and you have a considerable difference in refraction of the two eyes, you get an entirely false reading. The poorer eye will adapt itself to the focus of the better one. In

that way you get your reading considerably off, so it makes it absolutely essential that you have proper correction before you make the Maddox Rod Test.

Dr. H. D. Lamb.—I agree with Dr. Woodruff and Dr. Post that the muscle test (whether with Maddox Rod or other apparatus) should be made with the patient wearing his full correction. Indeed, in my experience, it is best to defer such testing until the most accurate correction possible has been worn for several weeks. It is a well known fact that the large majority of these muscle imbalances, as determined at the first visits, disappear after wearing the proper correction for a few weeks. It seems that in some cases a good result is not obtained because the prism is not worn in sufficient amount. I have recently observed a patient with six degrees of exophoria at 20 feet and sixteen degrees of exophoria at 14 inches, but no hyperphoria. Varying strengths of prisms, bases in, were tried for near work, in the office and at home. None were comfortable for any length of time until six degrees, bases in, right and left, was put on when entire comfort, even in prolonged near work, was obtained.

Dr. W. H. Luedde.—With reference to the amount of hyperphoria requiring or susceptible to correction, I would like to report two cases. The first one seen thirteen years ago showed a hyperphoria of ten degrees corrected by four degree prism, base down, on one eye and a six degree prism, base up, on the other eye. His age was then 33 years. He had never worn a correction for this condition. He promptly accepted his new glasses and commented on the benefits of binocular vision, based on his own observations. I had supposed his capacity for binocular vision was lost as he stated that he had never been able to use the two eyes simultaneously. He had worn, previously, only a correction for his compound hyperopic astigmatism and anisometropia which required $+4$ sphere right and $+2.50$ sphere with $+1$ cylinder, axis vertical

left. He had worn such a correction since childhood. He recently required the usual addition for presbyopia but accepted no change*at all in the degree of the prisms combined with his hyperopic correction which continues to be worn with perfect comfort.

The second case was a Circuit Judge, aged 63, who was much confused in his reading vision. Apparently this was due to one-half degree of left hyperphoria, for its correction brought him entire comfort. A readjustment for increased presbyopia four years later revealed that every indication for correction by prisms had disappeared. The attempt to add it to his new correction produced actual discomfort. It would appear that each of these cases must be a law unto itself, and that no hard and fast rule can determine how long a given correction with prisms will retain its maximum efficiency, which experience teaches is likewise true of corrections made up of spheres and cylinders.

Double vision when revealed by colored glass over one eye means a heterotropia rather than a heterophoria. To reveal the latent lack of muscular balance present in the latter condition, it is necessary to use the Maddox Rod or similar device to break up the instinctive fusion of images of the two eyes. In border line cases we may occasionally get doubling with either method depending apparently upon the amount of fatigue. Objection has been raised to the use of a tangent screen because the selection of the point at which the secondary image is located interferes more or less with primary fixation. For this reason, the late Dr. John Green preferred to accept the simple statement of the patient in inches or feet as to the distance between the primary and secondary images. This statement had no absolute mathematic coefficient but its comparative value in subsequent examinations for the same patient under the same conditions was probably equal to measurements recorded by any other method. The position of prisms is properly designated by the position of the base. The term "axis"

is reserved for cylinders and not used in indicating the position of prisms.

Dr. J. W. Charles.—When one eye does not see quite as well as the other, if the difference in vision is not too great, it is better to put the Maddox Rod over the best seeing eye and fix the light with the worse seeing eye. It makes the test more accurate.

Dr. John Green, Jr.—It is important, as Dolman has recently pointed out in his paper on the Maddox Rod Screen Test, that the patient should fix the light and not the rod.

Dr. Wm. F. Hardy (Closing).—In regard to what Dr. Woodruff has said, I am of the opinion that the Stevenson test for near is somewhat of a check on the amount of presbyopic correction to give the patient. There is no fixed rule for adding a certain amount of plus glass for reading in the individual case. If for instance in a 55 year old patient a plus 2 sphere is added there may result a 3 or 4 degree exophoria for near. It may give greater comfort than a plus 2.5 sphere added, which is the strength ordinarily given at the age of 55. It will give more comfort for the reason that with a 2.5 sphere added the exophoria may equal 7 or more degrees. With reference to Cogan's Chart, I am very anxious to hear from Dr. Higbee about it, because I must confess I am not familiar with its use. If it gives better results I wish to employ it. Dr. Luedde made mention of Landolt's method of prism measurements. It would appear that in clinical work prism estimates are relative affairs, just as tonometric findings are relative estimations of the actual intraocular tension. In both instances a basis is furnished for making clinical comparisons. Dr. Post mentioned the difference in vision in the two eyes and the estimation of the esophoria in such cases. I feel that the vision of the poorer eye should be brought up to or as near the other as possible before making prism measurements, as a large difference in visual acuity would naturally militate against exactness. One should not be in a hurry to prescribe prisms and it is my custom

to loan a pair of prisms for home use or in work and let the patient try them out thoroly. It may be that the strength will be varied from time to time until I have found that which is seemingly the best. In exophoria I follow Posey's advice and correct one-fourth to one-third of the error. Hyperphoria of 5 to 6 degrees certainly calls for operation in the majority of cases.

Dr. E. H. Higbee.—Cogan's chart is a chart laid off just the same as an astigmatic chart; it is also laid off in circles. The centre of it has a hole 1 cm. in diameter, behind which is a light. The chart is placed 20 feet from the patient who wears a red glass over one eye. If there is a displacement of the images the patient will tell you on what meridian he sees the red light. By simply correcting with prisms until these lights blend you have your correction.

Review of Recent Literature on Muscular Anomalies.—Dr. H. S. Hughes read this paper but there was no discussion.

JOHN GREEN, JR.,
Secretary.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA

February 19, 1920

DR. G. ORAM RING, Chairman

Double Extraction of Dislocated Lens

DR. HOWARD F. HANSELL reported a case operated on as follows:

Double iridectomy, March, 1918: R. lens extracted in May, 1918; L. lens extracted in November, 1918.

The visual result on February 19, 1920, was:

R. + 9 \bigcirc + 3 ax. $155^{\circ} = 6/5$.

L. + 10 \bigcirc + 1 ax. $130^{\circ} = 6/5$.

The patient's father and mother were first cousins and the children of twin sisters. Her parents had eight children. After each child reached the age of thirty-five the sight became affected. One sister and herself with cataract, eldest sister blind for twenty

years. Sight of all three brothers bad, cause unknown. A sister was operated on successfully for cataract in one eye. The surgeon refused to operate on the second eye. Parents' sight good.

Blindness, Traumatic and Psychic.

DR. HOWARD F. HANSELL read the paper published in full on p. 512.

DISCUSSION: Dr. F. X. Dercum said he experienced some diffidence in addressing the Ophthalmological Section of the College. He realized that he was speaking in the presence of those who are especially qualified to express opinions on ophthalmologic matters. However, it seemed to him there was only one explanation possible for the case which Dr. Hansell had so beautifully presented. In the first place, according to the ophthalmologic findings, the injuries to the right eye were not of such nature as to account for the blindness in that eye. Secondly, the blindness in the left eye, which was normal to all examinations, came on very suddenly at a much later period and bore a close relation to the unfortunate experience which the patient had had with the compensation board. The light reflex, and in this Dr. Hansell was in accord, was well preserved in both eyes. This meant that the tracts, as far as the primary optic centers and inclusive of these centers, must be functioning normally. Further, if a lesion existed back of the primary optic centers in either hemisphere it would, in order to give rise to blindness, involve either the optic radiation or the cuneus. This would, of course, give rise to a homonymous lateral hemianopsia, a form of blindness which was clearly not present in Dr. Hansell's patient.

The case, in Dr. Dercum's judgment, was one of hysteria and must be classed with the shell-shock cases observed during the Great War. Like all cases of hysteria, the symptoms presented bear no relation to the facts of anatomy or indeed of physiology, and to him there is no other conclusion possible than that the blindness is psychic.

The fact that there was now an im-

provement in the vision, especially in the left eye, was in keeping with the improvements observed in functional cases. It would appear as tho the sense of injustice which the patient experienced from a reduction of his compensation aggravated the symptoms from which he suffered, *i. e.*, it led to an emphasis, a subconscious exaggeration, of his injuries and wrongs. Finding later that no change was taking place in the matter of his compensation, the symptoms were again growing less, very much as they do in litigants in the courts whose claims are non-suited or otherwise come to naught. Dr. Dercum was reminded also of the interesting experience among our troops in France as reported by Surgeon-General Ireland, who stated that of 2,300 cases of shell-shock, with symptoms of deafness, blindness, palsies and other most diverse phenomena, 2,000 recovered on the very day of the Armistice.

Dr. William M. Sweet said that he examined the eyes of the patient the morning following the loss of sight in the left eye, and at that time there was faint light perception in the upper inner field of the right eye, but no light perception in the left. The pupils were equal and responsive, and, except for the choroidal rupture in the right eye, the eyegrounds were normal. At an examination a few days ago the vision had returned to 20/70 in the left eye. Dr. Sweet considered the case to be one of psychic blindness, secondary to the shock and anger of the boy when his pension was reduced to a mere pittance, and believed that vision would ultimately return to normal in the left eye, with some sight in the right.

In discussing Dr. Hansell's paper, Dr. Risley said he was deeply interested in the report of Dr. Hansell's case. He had already reported eight examples in which blows upon the orbital ridge had produced serious impairment of vision, followed by secondary atrophy of the optic nerve and complete or partial blindness. They will be found in the published *Transactions of the American Ophthalmological Society*. His explanation at the time was that the force of

the blow on the brow or the anterior segment of the skull was transmitted thru the bony structures to the foramen lacerum and to the pathway of the nerve thru its bony groove at the base of the skull, probably pinching the nerve. He believed that this was the explanation in the case under discussion, and was inclined to explain the temporary blindness of the fellow eye by the less serious character of the injury transmitted to that optic nerve, so that repair was possible. He did not, therefore, think it was necessary to resort to the theory of "malingering" to explain the situation.

Vernal Conjunctivitis

DR. EDWARD A. SHUMWAY showed a case of vernal conjunctivitis of unusual severity, in which the growths on the palpebral conjunctiva had been successfully removed by five applications of radium over a period of six months. The dosage varied from 20 to 50 mg. and the exposure from 15 to 20 minutes in each upper lid. Vision was 5/5 in one eye and 5/30 in the other, the reduction being due to a corneal macula from ulceration, which had occurred before the radium treatments were instituted. In addition to the local reaction in the form of erythema of the skin, and temporary loss of the eyelashes following the radium applications, he had noted the formation of small localized abscesses of the conjunctiva of the lower lids, which required incision.

Dr. Posey said that he had recently had under his care a case very similar to Dr. Shumway's in which the radium treatment had been most successful, the hardened hyalin nodules gradually disappearing from the conjunctiva. In this case, however, the radium applications were followed by abscesses in both lids, which led to the loss of a number of the cilia.

Dr. Holloway stated that he has previously referred to two cases of vernal conjunctivitis, in which successful results had been obtained by the use of radium, and he was only too glad to verify Dr. Shumway's statements in regard to the efficiency of this

method of treatment. He thought, however, attention should be called to the observations of Luedde in regard to the beneficial results obtained by the local use of fibrolysin. This observer has recorded a number of instances in which the local instillation of this drug has given rise to very rapid and in some instances apparently permanent results. In some cases he has felt it expedient to precede the local installation of fibrolysin by a drop of holocain.

Dr. Holloway stated that he had been keeping in reserve an ampoule of fibrolysin for a case of vernal catarrh, but none recently has come under his observation in his private work. For a time during the war this drug was off the market and he was unable to say whether it could be obtained at the present time.

Ocular Pemphigus.

DR. WM. CAMPBELL POSEY read the paper published in full (p. 507).

DISCUSSION.—Dr. Burton Chance stated that he has been interested in the subject of pemphigus for many years, since the time of his first case, which was diagnosed as one of "essential shrinkage of the conjunctiva," because of the absorption of the tissues and from consequent contraction, until there was an eruption of true pemphigus vesicles. In his opinion, from the account given, Dr. Posey's case is undoubtedly one of pemphigus. Without criticizing the diagnoses made by the clinicians mentioned, it might be of interest to repeat what Dr. During remarked when he was consulted about Chance's case many years ago. That eminent dermatologist stated that the differential diagnosis would always be most difficult because the two diseases are so very rare; it was his belief, however, that the ophthalmologist would be consulted more likely by cases of pemphigus than by those expressing phases of impetigo herpetiformis. While at the General Hospital of the Army at Cape May a soldier had been assigned to Dr. Chance who had been affected while in France. There had been much uncertainty over the diagnosis, but Lieut. Whitman, from his

most careful and painstaking study of the case, all of which was in consecutive detail in the clinical record, had concluded in the face of the opposition by competent dermatologists that the disease was pemphigus. After the man's arrival in this country ample opportunities arose for Dr. Chance to confirm Lieut. Whitham's diagnosis, and the case was reported in detail by Capt. Connor and Capt. Burkholder prior to their sailing for France.

Dr. Shumway spoke of the great rarity of the cases of pemphigus, and said he had seen three well-marked cases, one of which he had demonstrated before the Section in 1909. In this patient there was widespread involvement of the skin, not only of the trunk and extremities, but also of the scalp, and the patient had died later from exhaustion at the Philadelphia Hospital. A second case had been treated at first for trachoma, and an operation done for ectropion; but lesions were found later in the throat and the true nature of the condition was evident.

Dr. Shumway discussed the question of the identity of essential shrinking of the conjunctiva and pemphigus, and said originally they were held to be separate conditions, but that most authorities, especially eye surgeons, now considered them identical, though many dermatologists disputed this view. In trachoma the differential diagnosis was at times difficult, but the presence of pannus would point definitely to trachoma. Treatment was unavailing, and operative interference apparently hastened the process.

Dr. Posey, in closing, said the first case of pemphigus he saw was at Moorfields, in a middle-aged man, in whom the inflammation had run a much more chronic course than in the case just reported by him. Here the malignancy of the inflammation was intense, the two opposing surfaces of the conjunctiva becoming glued together despite all his efforts in but two or three months. There evidently are two distinct types of the disease.

Essentials of Perimetry.

DR. LUTHER C. PETER read a paper

upon this subject which will be published in full in this Journal.

DISCUSSION.—Dr. Geo. S. Crampton said that perimetry as practised at the present time, while much more accurate than it was a decade ago, is still subject to a considerable number of errors even in the hands of those who have taken pains to improve their technic in every possible way, and any attempt to standardize the nomenclature and practice of the art must meet with our approval.

The question of properly illuminating the test object is of considerable importance, especially now that there is an increasing tendency to use objects which subtend very small visual angles, as it has been shown that very small test objects are more sensitive to variable illumination than the larger sizes.

While we have found ordinary daylight too variable for our test cards, most of us have continued to use it for perimetry, largely because of the difficulties involved in properly lighting our instruments or tangent screens. This subject is being studied at the present time by a committee of the American Ophthalmological Society, and it is probable that suggestions for a standard method will be announced shortly.

The recently invented daylight screens will, no doubt, be of great service in illuminating our test objects in their true colors, but they are very wasteful of energy and may not prove practical for this reason in the illumination of large tangent screens unless some means be devised for local illumination upon the surface of the test object carried in the hand. While transillumination of the test object has not proved entirely successful up to the present time this method may yet prove of value when more fully studied. Unfortunately it is difficult, or I might say impossible, to obtain spectrally pure translucent screens, and even our best pigment papers are apt to surprise one who views them through a spectroscope for the first time.

Fortunately, Clifford Walker and others have demonstrated that we can,

as a rule, get along very nicely without using colors at all, as color defects are almost always represented by form defects when the visual angle is made small enough.

The factors of preexposure and surrounding field should be considered in relation to their effect upon the outlines of the visual field. It is a question yet to be decided whether these two factors which Drs. Ferree and Rand have demonstrated to have a marked bearing on the limits of their fields as taken in the laboratory will have an appreciable influence upon the art as practised by the ophthalmologist. Certainly nothing should be omitted which will give us better results in our every-day work.

In reference to the dimensions of the test object, it is gratifying to note a growing tendency to speak of the visual angle subtended rather than to refer to an object of a certain size, as in the latter case the screen distance must also be mentioned or the size has no meaning. In any case round disks only should be used, as the angle can be readily found if the diameter of a round disk is stated, together with the distance at which it is used.

Clifford Walker's careful work in giving us graphic charts whereby the visual angle for test objects of varying sizes and distances can be told at a glance should not be overlooked.

He has considered most of the errors that may affect our perimetric results, and has shown how they may be eliminated to a considerable extent at least. If the graphic chart is not at hand the visual angles can be readily computed by multiplying the disk diameter in millimeters by the constant 3437.7 and dividing the result by the distance in millimeters. This will give the visual angle in minutes.

Walker states that in using a visual angle below 7.5 minutes (0.6 mm.) at the usual perimeter distance the size of the disk supporter becomes disproportionately large and may mislead the patient. Below a five-minute angle it is better to change to a campimeter or a perimeter of greater radius.

It was found that a disk of about 1 mm. diameter had the widest range of usefulness, and that it was most convenient to use the 1.2 mm. disk and distances of 1,000—1,500—2,000 and 2,700 mm.

Dr. C. E. Ferree and Dr. G. Rand, of Bryn Mawr College, said that the difficulty of getting reproducible results in determinations of the color sensitivity of the peripheral retina is a common complaint among laboratory and clinic workers. The actual distribution of retinal sensitivities is only one of the factors influencing the results of a perimetric or campimetric determination. By varying the conditions under which the work is done the zones of color sensitivity may be made to have almost any extent within the limits of the field of vision, and to vary radically in shape.

The variable factors which influence the apparent limits of color sensitivity are, so far as we have been able to determine, the wave-length and purity of the stimulus, intensity of stimulus and the visual angle, length of exposure of the eye, accuracy and steadiness of fixation, the general illumination and state of adaptation of the retina, breadth of pupil and the brightness of the preexposure and of the background or surrounding field. Only a few of these can be considered here. (1) The most important factor is intensity of stimulus. With very high intensities the limits of red, blue and yellow are coincident with the limits of the white light vision. Green cannot be made to have so wide an extent. With stimuli of medium intensities of equal energies the limits of red, blue and yellow interlace or criss-cross. Again, the limits for green are narrower. The conventional clinic rating from widest to narrowest of blue, red and green is, with the exception of green, a function of the intensity of the stimuli employed. A decrease of intensity of the stimulus not only narrows the limits, but, because of the irregular distribution of sensitivities in the different meridians, causes a marked change in the shape of the zones of sensitivity. (2) Breadth of

pupil is effective thru influencing the clearness of imaging, the amount of light entering the eye and the degree of excentricity at which an image may be formed on the retina. (3) The brightness of the surface to which the eye is preexposed may change the limits in certain meridians as much as 20 degrees. A preexposure lighter than the color gives a dark and one darker than the color a light after image. These achromatic or brightness after images change profoundly the saturation of the color sensation, also its hue. (4) A background or surrounding field lighter or darker than the color produces a similar but not so great an effect on the limits. In this case a disturbing achromatic effect is produced by physiologic induction or contrast. The variable effects of brightness of preexposure and surrounding field can be eliminated only by making both of the same brightness as the stimulus color. (5) When pigment stimuli are used the intensity of illumination of the perimeter arm conditions the intensity of the stimulus light. Also, unless this illumination is kept constant and is uniform for all points on the perimeter arm the variable effect of preexposure and surrounding field cannot be eliminated. That is the shade of gray which is needed to match the color in brightness, changes with change of illumination.

All of the above-mentioned factors can be standardized and controlled. When this is done the limits can be reproduced within a very remarkably small limit of error. We have devised and are having constructed a perimeter by means of which equal illumination of the stimulus is secured at every point of the arc, and the variable effects of brightness of preexposure and surrounding field can be eliminated with an ease and speed of manipulation which, we believe, is feasible for office and clinic work.

Discission of Lens in High Myopia.

DR. J. H. DEWEY said the opportunity it affords of observing the characteristic changes found in high myopia in an eye rendered practically em-

metropic by operation was his reason for presenting the case rather than the results of the operation or as an advocate of this procedure.

He rather tried to dissuade the patient from the operation, and the dangers were explained, but all that interested him was getting away from the thick lenses, and he was perfectly willing to assume all the risks.

Before operating the vision in R. with S. — 18 = 5/20. L. S. — 20 = 5/20.

The knife needle was entered thru the sclera in all the discissions. Only after one was there any reaction. This one was followed by some pain, with slight ciliary injection the next day, but entirely subsided in twenty-four hours.

Several operations were done on the left eye and five on the right one. The first operation on the left one was performed on June 18, 1917, and the last one September 7, 1918. The first one on the right eye January 25, 1919, and the last one December 15, 1919.

The vision now in R. with S. + 0.50 \ominus cyl. + 1.00 ax. 180 degrees = 5/9 L. with S. + 0.50 \ominus cyl. + 1.00 ax. 180 degrees = 5/7 full, and several letters of 5/5. The improvement in vision is rather better than stated in the numerous tables published showing the results which should be obtained after removal of the lens in high myopia, and the correcting lens corresponds closely to the one that should be expected, according to Hirschberg's table for the reduced eye.

That the operation has no influence on the increasing myopia is unfortunately already demonstrated in this case, in which the myopia has increased in the left eye one diopter in a little over a year.

As to the danger of increasing the tendency to detachment of the retina there can be no question, but statistics vary greatly on this point.

In discussing cases adapted to the operation, Dr. Dewey found only those of high myopia advocated. It occurred to him that the operation might have its most legitimate field in a class of cases in which the myopia runs from 7D. to 15D., and the vision with cor-

rection is between 5/20 and 5/50, the patient still able to read fine type.

To have this vision doubled would be of great advantage, and it would seem reasonable to suppose that the danger of subsequent retinal detachment would be less than in the higher myopes.

Cocain Poisoning.

DR. HAROLD G. GOLDBERG reported the case of a patient who had been operated on a short time before under cocain anesthesia without any ill effects, but upon the occasion reported, more than the usual number of drops had been used, which he believed had passed through the tear duct and an excessive amount of the drug absorbed. The patient showed typical signs of cocain poisoning, but recovered without injury to the eye or general health.

In discussing Dr. Goldberg's paper, Dr. Risley said he had seen no striking example of serious cocain poisoning, but had not infrequently witnessed what appeared to be hallucinations which he ascribed to the constitutional effect of the cocain after repeated instillations of 4 per cent. solutions during more or less prolonged operations. He had, however, soon acquired a sense of anxiety lest the profound local effect witnessed after the instillation of 4 per cent solutions of the earlier preparations of cocain should disturb the prompt healing of the wound. In the earlier preparations which came into our hands he thought there was a degree of sudden blanching of the tissues, with conjunctival edema and infiltration of the epithelium of the cornea, disturbing its transparency, to an extent he had not witnessed in the 2 per cent solutions which he is habitually using during later years. Indeed, the difference was so striking that he was led to inquire whether there might not be some change in the mode of the manufacture of the drug as now present in the market.

Dr. Peter said: Apropos of the case which Dr. Goldberg has reported, he wished to cite an instance of cocain collapse which occurred several years

ago from the use of tabloids of homatropin and cocain. The patient was a man of about thirty-five. Two tabloids were introduced into the culdesacs, each tabloid containing one-fiftieth of a grain of homatropin and one-fiftieth of a grain of cocain. As was his usual custom the patient was instructed to compress the puncta for about five minutes. He evidently failed to follow instructions, and in about five minutes suddenly collapsed in the office and dropped to the floor pulseless and the respiration ceased. The recovery was rather prompt after the patient fell into a recumbent position. He had no reason to suspect that this was of psychic origin, inasmuch as the patient had had drops instilled into his eyes on former occasions. It was a typical cocain collapse. The maximum amount of cocain that the patient could have received from these tabloids was one-twenty-fifth of a grain.

Contusion of Eye with Oil Droplet Staining of Conjunctiva.

DR. H. MAXWELL LANGDON related the case of J. K., male, aged forty-one years, who was first seen January 19, 1920, with a history that two hours before he had been struck in O. S. with a jet of heavy gas oil coming from a tank under the pressure of between 50 and 60 pounds to the inch. O. D. was perfectly quiet. In O. S. the lids were slightly swollen, the conjunctiva greatly chemosed and discolored in two irregular patches running horizontally, one above and one below the cornea, each having its border nearest the cornea about 3 mm. from the limbus. There was a slight abrasion of the cornea in its lower portion, otherwise the eyeball externally and internally was negative. O. D. V. = 6/VI. O. S. V. = 6/X. under the loupe the masses of discoloration were found to consist of many minute droplets of oil, which had been forced into the conjunctiva by the great pressure. The course of the condition was as follows:

A great increase in the chemosis of the conjunctiva and much swelling of the orbital tissues, so that the eyeball

was not only moderately proptosed, but there was a distinct loss of motility. In four days under constant ice compresses the swelling had subsided and motion was much better. Within ten days after the accident conditions were normal except for some residual staining of the conjunctiva, which has since, under dionin and hot compresses, entirely disappeared. With a -0.50 spherical $V = 6/V$.

The interesting feature in this case is the fact that in spite of the great pressure, sufficient to drive the oil into the conjunctiva, the eyeball itself suffered no injury except the very slight abrasion of the cornea.

Dr. Holloway stated that in Dr. Langdon's interesting case the manifestations were most unusual, and it was the first time he had an opportunity to observe a case of this character. Not infrequently patients come to a clinic stating that they have been impressed by fluids under high pressure, but almost invariably one finds that the statement is incorrect or not wholly true. He then cited an instance in which the patient's first statement was that he was struck by a stream of water under high pressure, but subsequent events proved that he had really been struck by a brass valve driven out by the force of the pressure.

Deep Peripheral Keratitis.

DR. W. T. SHOEMAKER reported Mrs. M. A., seen at service at the Pennsylvania Hospital on February 9, 1920, with the following history:

Four days previous to this a dimness of vision of the right eye had been noted. (The patient had visited the dispensary for refraction in September, 1919, when O. D. V. = $6/V$.) There had been no pain or tenderness of O. D., and the left eye seemed in every way unaffected.

Examination of O. D. showed a very slight enlargement of one or two of the lower conjunctival vessels; no ciliary injection whatever. In the cornea there was a triangular patch of infiltrate, the base being at the lower limbus and the apex in the center of the cornea, the base being 8 mm.

across. It was gray except for a band running parallel with the limbus, about 2 mm. broad, which was decidedly reddish in tint, suggesting a "salmon patch." The corneal epithelium was unbroken. The pupils were equal and responded promptly to light and other stimuli. There was no discoloration of the iris of O. D. Ophthalmoscopically the media were clear and the fundus unaltered. Under the loupe the infiltrate was seen to consist of many vertical parallel lines irregular in outline but very regular in their vertical course. The "salmon patch" was seen to be made up of many fine capillaries growing into the corneal parenchyma from the limbus. Physical examination showed no organic changes in any of the viscera. The complexion of the patient suggested a moderate anemia, and the blood examination showed a hemoglobin of 75 per cent; red blood cells, 3,140,000; white blood cells, 9,000. The Wassermann was weakly positive. The patient has been placed on Bland's pills, mixed treatment and locally atropin and dionin. The sclera in the lower portion has become a little more congested, and there has been decided increase of vascularity in the "salmon patch," so that the tint is nearer carmin than "salmon."

In attempting to identify the type of keratitis, which was obviously interstitial in character, it was narrowed down to one of three possibilities: The so-called deep marginal keratitis, described by Fuchs; sclerosing keratitis, and a type of interstitial keratitis mentioned by Roemer, but given no definite name. It has seemed that the keratitis marginalis profunda might be excluded on account of the age of the patient, as it usually occurs in elderly people, the involvement of so much of the cornea, the fact that it usually occupies the upper portion of the cornea and because of the lack of inflammatory reaction. Sclerosing keratitis is preceded by a patch of scleritis, being a complication of that condition, and the patches are irregular in shape. It seems, therefore, that we should deal with that form of interstitial keratitis mentioned briefly by

Roemer, who simply says, "The entire opacity is found on the lowermost part of the cornea, where it assumes a triangular form, with the apex directed upward."

In view of the negative physical findings, except for the moderate anemia and the weakly positive Wassermann, it seems most likely that this case is specific in origin. As to whether it is hereditary or acquired it is impossible to say; no other signs of hereditary syphilis are present; the patient is one of four children, all living and well, with no miscarriages in that generation. She has had two pregnancies and two children, both living and well.

Dr. Posey said that he remembered presenting to the Section two cases of triangular opacity of the cornea in syphilitic subjects several years ago. The opacity in each instance had appeared some time after the inflammation had first inaugurated itself. He thought it a matter of clinical experience that in cases of commencing keratitis parenchymatosa the cornea frequently becomes infiltrated in localized areas, and that sometimes a triangular opacity appears at the margin of the cornea and retains that form for a time before extending over the entire membrane. This peculiarity in form is due to a syphilitic affection of the marginal loop of blood vessels, and it is not unlikely that the persistence of the triangle in the two cases presented was dependent also upon vascular causes.

In discussing Dr. Langdon's case, Dr. Risley said the condition of the cornea recalled the group of cases he had already published in which these conditions had rapidly recovered under the administration of the pulverized thyroid gland of the sheep. In a word, the general appearance of the patient and the corneal condition suggested to him a case of hypothyroidism.

Extraction of a Morgagnian Cataract.

DR. G. ORAM RING presented a brief report of an interesting accident in connection with the extraction of a Morgagnian cataract.

The patient, a male, aged sixty-three

years, weighing 180 pounds, of ruddy complexion and good, general health, had been blind in both eyes from cataract for nine years.

The lenses were homogeneously gray, with a conspicuous series of dense white dots of capsular proliferation. The nucleus was invisible. Perception and projection were good. Dilatation under mydriatic was moderate.

Operative treatment had been declined previous to December, 1919, and no remedy other than the soporific toxin of Christian Science had been utilized.

A preliminary iridectomy was performed early in December last, the healing of which was entirely uneventful.

One month later, under cocain, the usual flap, including the upper third of the cornea and a small amount of conjunctiva, was made.

Following the application of the cystitome to the capsule because of the patient's nervousness, the lids were closed and the operation suspended for a moment.

Upon opening the lids the entire pupillary area was perfectly black (the liquid cortex having completely extruded itself), except that the dense, hard nucleus had fallen down to the base and temporal side of the capsule, back of the outer pillar of the iris. It becoming evident at once that corneal pressure would not complete the extraction, the 5 mm. nucleus was delivered by a small loop without accident.

A slight but temporary cystoid cicatrix was the only complication of the healing. Corrected vision was 20/30.

Dr. Ring thought it possible that had the interval for rest not been utilized the nucleus might have been extruded with the onrush of the milky cortex.

Reference was made to the return of sight in Morgagnian cataract by liquefaction and absorption or by the bursting of the capsule and the absorption of the semiliquid matter, which discharged itself into the anterior chamber.

Dr. Chance stated that he was very

much interested in Dr. Ring's account of his case of Morgagnian cataract. He himself had had two quite interesting cases of hypermature cataract which he reported several years ago. He cannot help but be grateful that Dr. Ring had succeeded in snatching a case from the clutches of the Faith Curists, for the history of pilgrims to faith cures discloses that many instances of recovery from blindness in those known to have had cataracts were truly cases of hypermature cataracts which had undergone dissolution. He was especially interested in Dr. Ring's patient, in so far that that gentleman had been his own first music teacher, and he cannot help but deplore the misfortune that so charming and useful a person had been consigned to darkness for so many years, when it would have been entirely possible for him to have recovered his sight and continued his musical practice.

J. MILTON GRISCOM, M.D.,
Clerk.

CHICAGO OPHTHALMOLOGICAL SOCIETY

February 16, 1920

DR. ALFRED N. MURRAY, President.

Ocular Manifestations in Encephalitis Lethargica.

DR. SYDNEY WALKER reviewed the recent literature of this subject.

In one of the two cases he had, the ocular symptoms had been very prominent. This case, seen by Dr. Hamill, ran a more or less typical course, developing a divergent palsy, and a loss of his accommodation early in his illness. Just before his illness a small correction obtained 20/20 vision. At that time there were no fundus findings, and just recently he examined him again with a like result. The divergent palsy had remained stationary, but there had been a partial return of the accommodation.

The second case was somewhat less definite in character. The patient, 23 years of age, had been suffering with what his physician had termed a

nervous breakdown, and while in this condition had been semicomatose for a period of ten days. He came to the office some days after, complaining of an inability to read and upon examination he found a total loss of accommodation and a convergence insufficiency. Otherwise the eyes were negative. These were the only ocular symptoms present at any time during his illness.

CONCLUSIONS.—1. The ocular manifestations in encephalitis are numerous, and are not constant.

2. The virus appears to have a predilection for certain cranial nerve nuclei.

3. The third nerve is most often involved, alone or in association with other cranial nerves.

4. Lesions of the optic nerve are not one of the manifestations of this condition, but might be one of the complications.

DISCUSSION.—Dr. George W. Hall said that the ocular manifestations were not infrequently the prodromal symptoms, and for that reason the oculist was likely to overlook the particular condition that he was dealing with at that time. The temperature might not be high. The patient might complain of slight drowsiness; he might have a paralysis, or a transitory paresis, perhaps of the internal or external rectus, and the diagnosis at that time might not be easy to make. In a few days that condition might abate to some extent; it might disappear. On top of that we found possibly facial paralysis supervening, and then lumbar puncture would aid us in clearing up the diagnosis.

Of the ocular manifestations, drooping of the eyelids was perhaps the most common; next was paresis of the external rectus, and to a less extent other ocular manifestations. But the partial third nerve paralysis in the large percentage of cases was most frequently present.

He reported a case which entered his service at the County Hospital on March 31, 1919. At that time both lids were drooping; the palpebral fissures were very much

narrower; the pupils responded to light very sluggishly, and were slightly irregular; the right pupil was larger than the left. The conjunctiva was injected; nystagmus was present, and on April 5, the right eye deviated to the right and there was more decided ptosis on that side. On the 7th day patient complained of complete blindness in both eyes which seemed to have developed rather suddenly. He had at that time complete external and internal ophthalmoplegia. He also developed facial paresis on both sides. There was deafness in the left ear, to the watch tick. On the 8th, the next day, the right and left eyes reacted sluggishly to light. The nerve head was normal. On the 9th day the patient's eye grounds were checked up by Dr. Cushman, and she found the disc and blood vessels normal at the time. On the 9th day patient could count fingers in front of the eye. On the 10th there was very good movement of both eyes.

About spinal fluid, there might be differences between the findings in the spinal fluid of polioencephalitis or poliomyelitis and encephalitis lethargica. The spinal fluid in some of the most severe cases of lethargic encephalitis was perfectly normal. In those cases which showed extreme delirium, which gave an exact picture of delirium tremens plus eye paresis, the spinal fluid was absolutely normal. He had seen some six or eight cases of that type. A cell count was made on two or three different occasions, and never more than six or eight cells per cu. mm. were found in the spinal fluid. In those cases, however, which showed marked involvement of the basal ganglia, that is, complete bilateral facial paralysis, with more complete ocular findings, there was a cell count of 250 or 300. In such instances tubercular meningitis was considered in differential diagnosis.

Dr. L. J. Hughes, of Elgin, Illinois, reported a case he had under observation at the present time of a man, 35 years of age. Three weeks ago he was taken with pain in his stomach and a local physician diagnosed his case as

one of stomach trouble and put him on appropriate treatment. He came gradually worse and went on developing a lethargic state until he was practically comatose. He developed lateral nystagmus and complete blindness. He saw him the latter part of last week for the first time. The nystagmus was very marked. He had bilateral facial paralysis, which was not complete but quite marked. He had some difficulty of speech. He had slight ptosis of the lids at the time. There was no divergence, however, of the eye, but the fundus findings were plainly marked. There was rather marked edema of the retina in each eye, with some slight tortuosity of the vessels. He had been totally blind, and his condition was beginning to improve. His nystagmus was becoming less; his vision was returning. He was seen by Dr. Pollock who made a diagnosis of lethargic encephalitis. The findings were practically those given by the essayist. The treatment in this case was 30 grains of aspirin, and 30 grains of bicarbonat of soda, every 4 hours.

Dr. Frank Brawley reported what he considered a milder case than any which had been reported. It was in a case of influenza which was followed by pneumonia. There was complete third nerve paresis, with the usual lack of any accommodative power. At the time he saw the patient there was no diplopia, but the pupils were completely dilated and fixed. There was nothing to be seen in the fundus, and altho he suggested the possibility of encephalitis to the attending physician, he said he was not able to find any symptoms outside of the eye condition. At the time he saw the case there was beginning to be improvement, the diplopia had disappeared, and there was beginning return of accommodative power. The pupils still remained dilated and fixed.

Dr. Thomas O. Edgar, of Dixon, Illinois, reported a case of encephalitis lethargica which he was called to see on December 20, 1919, three days before the patient's death. E. C. F., a girl, aged 15, two weeks previously had had a discharge from the nose, follow-

ing which she became sick; at times complained of a headache, especially in the right frontal region. About December 10, according to her physician's report, the patient exhibited jerky or almost chorea-like motions, but a few doses of bromids quieted her; since that time she was always drowsy, but answered questions intelligently and promptly. For the three or four days preceding December 20, the patient was unable to cough up any of the mucus, which accumulated in her throat. Heart action and lungs had been normal. She had a slight fever. Patient had complained of diplopia for a few days. Pupils had been unequal, the right one being larger than the left. When seen by him, the eyes were partially open, but turned up; patient was unable to rotate eyes downward; fundi normal; the pupils were unequal, the right one being the larger. They reacted to light, but motion limited. A culture made from the middle meati of the nose, showed cocci arranged in pairs, a few chains and irregular groups. Suction failed to bring out any discharge from the sinuses. The following night, the patient's temperature rose to 105° and death occurred on December 23.

Wells P. Eagleton, in the *Annals of Otolaryngology and Rhinology* for September 1919, called attention to two points: First, the frequency of ambulatory patients; secondly, the lack of reference in the literature to the involvement of the eighth nerve, particularly of the vestibular apparatus. Of 7 cases seen by him, 4 were ambulatory. All of these ambulatory cases exhibited a demonstrable disturbance of the vestibular reaction.

Dr. George F. Suker had under observation at the present time a case in which there was paralysis of the sixth nerve with nystagmus. The man was loquacious and grandiloquent, but other than that had made a complete recovery. It was contrary to his nature to be loquacious, and he would like to know whether this mental condition was now and then found.

Dr. Robert Von Der Heydt men-

tioned a rather unusual case he saw during the existing epidemic at the Robert Burns Hospital, which terminated fatally. In addition to a lethargic state, the man had ptosis. He remembered distinctly he had to hold up the lids to see the fundus, and in the fundus he found hemorrhagic retinitis three days before death.

Dr. Alfred N. Murray personally had seen two cases of encephalitis lethargica recently; one of the acute form with ophthalmoplegia interna and paresis of the ocular muscles. In this case he could obtain spontaneous nystagmus, both vertical and lateral. The man had paralysis of accommodation amounting to 2 D. He was so sleepy that one might think he was under the influence of an opiate. He had not seen the patient recently, so that he did not know what his present condition was.

The other one, after having recovered from the acute condition showed an exudate about the discs indicative of a preceding papillitis; and he had paralysis of accommodation in one eye amounting to 2 D. He saw him five months after his first visit and paralysis of accommodation of 2 D. was still present. He was recovering, but was still rather sleepy in his demeanor.

Dr. Hall said that Dr. Suker had called attention to an interesting point. Certain mental conditions might occur after apparent recovery in these cases.

A Preliminary Anatomic Study of Six Cases of Degeneration of the Cornea.

Dr. Charles Maghy reviewed the literature and stated that degeneration of the cornea was first described by Beselin as amyloid, in an eye that was staphylocomatous. He found in the superficial layers of the scar of the cornea peculiar, highly refractive, organic masses of various shapes, not unlike those pictures which Goldzieher, Saemisch, Wedl and Bock described as colloid of the cornea, which however, with a 2 per cent iodine solution gave the typical amyloid reaction. Beselin was of the opinion that the refractile masses were in no way related to the cells of the epithelial layer

and when found in this situation had invaded the same from the stroma corneae below. He reported 6 cases in all of which one saw connective tissue upon and calcification of Bowman's membrane at the same time, so he could not decide which was the primary. As to the causes of the calcareous degeneration, he enumerated:

1. Nutritive disturbances or diminished interchanges of material and senile alteration of the blood vessels (primary band opacity).
2. Evaporation and external irritation in the region of the lid fissure. From the occurrence at the same time of calcification in the posterior parts of the eye it was evident that the cause of the calcareous degeneration of the cornea was not only local in origin, as other authors said. The lime came from the nutritive fluid.

The homogeneous mass in his sixth case resembled very closely in shape and situation those found by Beselin, Saemisch, Goldzieher and Birch-Hirschfeld. Beselin regarded it as amyloid, because he obtained the iodine reaction, altho not markedly as was usual in the case of true amyloid. Saemisch and Goldzieher regarded it as colloid. They did not describe the color reactions. Birch-Hirschfeld obtained no iodine reaction, and regarded it as hyalin transformed from the blood proteids. Under the term colloid this author included glue-like masses produced by metamorphosis of the cell elements themselves. On the other hand, hyalin and amyloid generally were considered as formed outside the cells, altho lately it had been suggested by a few authors that amyloid arose from plasma cells. Baquis considered the color reaction for amyloid incomplete and regarded the mass in his case as colloid, notwithstanding the fact that it showed this color reaction. These varieties of degeneration came from the following circumstances:

1. The iodine reaction for amyloid was not present in the majority of the cases.

2. Differentiation of hyalin and colloid material was impossible both physically and chemically.

According to his ideas he should regard as amyloid those masses which showed more or less iodine reaction; it was conceivable that one body became transformed into another, and that thereby various phases appeared which stained incompletely by the given staining reaction. On the other hand, he should distinguish colloid and hyalin genetically. Most pathologists did this, altho their methods of differentiation varied. As Birch-Hirschfeld and other authors said, he accepted the possibility of the transformation of hyalin to amyloid and he regarded that in Beselin's case the hyalin was already changed into amyloid. In the author's cases the masses in the epithelium were always *intercellular*, not *intracellular*, contrary to the opinion of Baquis, and he did not regard it as a secretion from the epithelial cells. Also so far as the substantia propria and corneal lamellae were concerned, it was not in them, but between the fibers. This was also contrary to Beselin's view.

DISCUSSION.—Dr. E. V. L. Brown said that he was struck by the disposition of the hyalin in or along the course of the new formed vessels in the limbus placed both deep and superficially, yet he would hesitate to draw any deduction as to the origin of the hyalin from this alone.

Dr. Maghy was unable to come to a conclusion as to whether or not the pannus tissue was first formed in front of or behind Bowman's membrane. Serial sections would undoubtedly have helped in this matter.

Dr. Robert von der Heydt mentioned some of the newer methods for investigating the structures of the anterior eyeball.

Many of the changes observed in this manner in the living eye would escape detection by the ordinary method of examining stained sections.

Dr. Maghy, in closing, stated that in cases of band opacity of the cornea in which blood pigment was found, the question of whether this pigment was primary or secondary was of vast importance. If the pigment was de-

posited secondarily following glaucoma, why was it we did not see it more often in cases of secondary glaucoma? If it was a primary process, we ought to see it more frequently in cases where we had had hypopyon ulcer, with extensive scar formation and tension. We ought to see it in penetrating injuries in which the iris had been drawn into the wound.

Probable Melanotic Sarcoma at the Sclero-Corneal Junction.

DR. WILLIAM H. WILDER presented a patient, a woman 38 years of age with a tumor, probably malignant, in the sclero-corneal region of the left eye. The patient otherwise healthy, had had a discolored, brownish area in the ciliary region of the temporal side of the left eye since childhood. This was supposed to be a birthmark. The appearance of it did not change until four years ago when it seemed to enlarge and become thicker and to gradually extend toward the limbus. In the last year it had been more active and more vascular and was now seen as an irregularly shaped flat growth about 1 cm. in its longest diameter and possibly $1\frac{1}{2}$ mm. thick in the temporal ciliary region of the left eye. The growth was pigmented in places and had extended onto the corneal limbus for about $1\frac{1}{2}$ mm. in the form of a dirty grayish membrane.

It was impossible to say whether it had infiltrated the sclera. There was no pain, the vision of the eye was 20/30 and nothing abnormal could be seen with the ophthalmoscope or by transillumination. It had the appearance of a melanotic sarcoma altho one must remember that epitheliomas in this region might sometimes be pigmented.

After carefully presenting the dangers of the case to the patient it was decided to try the effect of radium before resorting to enucleation of an otherwise normal eye. So far nine treatments had been given.

Crania-Tabes.

Dr. George F. Suker presented the following case: Young man with optic

atrophy, bilateral, in whom 20/20 vision, each eye, with uniform concentric contraction of fields to about 15° had been maintained since 1916 by the intraventricular injection of bichlorid of mercury into the anterior horn of the right lateral ventricle. In all he received six injections varying from 1/100 grain to 1/25. The mercury was added to about one-half of the intraventricular fluid withdrawn and reinjected into the ventricle. Systemic and antisiphilitic treatment was also given.

Acromegaly.

Dr. Suker also presented a young man with positive evidences of acromegaly, in whom there was a concentric contraction of each visual field with but a semblance of bitemporal hemianopsia. Each disc showed a minimum amount of swelling (papilledema) on the nasal side. The sella turcica was rather large and showed evidences of a neighborhood involvement as well.

Persistent Hyaloid Artery and a Fusiform Aneurysm of the Superior Temporal Artery in Same Eye.

In this case, of a young man, presented by Dr. Suker, there were three distinct branches from the main trunk of the remains of a hyaloid artery. The three branches were free and motile while the trunk was fixed. The three branches were on the temporal side of the disc. The main trunk was about 5 mm. in length and their branches varied from 3 to 5 mm. in length. The superior temporal artery showed a fusiform dilation of about 5 mm. in length; vision was normal, and no other anomalies present.

Optic Neuritis (Wood Alcohol).

DR. G. F. SUKER presented a young man, who with three others enjoyed a methyl alcohol debauch. The other three died. When the young man was brought to hospital, he had vision in each eye, limited to hand movements. Spinal fluid and blood Wassermann negative and yet salvarsan, given in intensive doses and at relatively short

intervals, restored vision in each eye to 20/30. When able to take visual fields, no positive central color scotoma was obtainable, but only a central relative scotoma for color and form, for about 15° was obtained. The discs, six weeks after debauch, did not show any distinct evidence of atrophy, tho there was a moderate temporal pallor present in each. Whether or not the salvarsan injections had any direct effect in producing this rather good end result was not fully determined. And, still one could not altogether deny the influence of the arsenic in salvarsan upon the so-called retrobulbar optit neuritis. Free elimination with sweatings were the only other measures employed.

FRANCIS LANE,
Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY

February 21, 1920.

Dr. E. E. McKeown presiding.

Glaucoma Simplex.

H. R. STILWILL, Denver, presented a negro aged 40 years, the vision of whose right eye had been failing for three years, and entirely lost for the past five months. The patient had come on February 16, 1920, complaining of a growth on the right eye which he thought to be a cataract, but which was merely a conjunctival thickening to the nasal side of the cornea. He had seen halos, but there had been no pain or redness in the eye. The eye was divergent. The pupil measured 3 mm. in diameter, and did not react directly to light, but did consensually. There was no light perception in this eye. The tension was normal, the cornea clear and not anesthetic. The anterior chamber was not shallow. The entire optic disc was depressed about 2 mm. (7 D.), and a rather large vein was seen on the floor of the excavation. The disc margin was not undermined. The left eye was normal.

DISCUSSION.—Edward Jackson, Denver. In the absence of increased tension in the eye, and in view of the ap-

pearance of the disc, which has not deeply overhanging edges, it seems likely that the atrophy is not due to pressure, but to a cavernous degeneration in the head of the optic nerve. There is apparently a distinct class of cases with degenerative changes in the nerve head, but without increased tension. In these cases also there would be absence of pain and other glaucomatous disturbances.

Ossification of the Choroid.

H. R. STILWILL, Denver, exhibited a specimen of bony formation which had been found surrounding the optic disc in an atrophic eyeball. The specimen measured roughly 10 by 12 mm., and the opening corresponding to the optic nerve was distinctly to one side of the center. The patient who was 33 years of age had received twenty-four years previously an injury to this eye from the explosion of a dynamite cap; and the eye was now removed on account of chronic irritation.

Exophthalmus and Failing Vision; Doubtful Etiology.

D. H. COOVER, Denver, presented a woman aged 35 years in whom for two years there had been exophthalmus and failing vision, the cause of which had not been discovered. The trouble had begun in the right eye, the vision of which was now reduced to light perception. There was a very marked proptosis from the beginning, but never vomiting or much headache. After cleaning out of the right ethmoid, the proptosis partly receded, and the vision improved, but the improvement in each respect lasted only a few weeks. Some months later temporary improvement was again obtained in the same way. In November, 1919, the vision of the left eye began to fail, and at the time of report it was reduced to 3/60. The central field of this eye was gone, and peripheral vision was retained only in the temporal field. Pressure on the right eye produced marked pain in the orbit. The movements of the right eye were limited upward and inward. The pupil of this eye did not react either directly or consensually. There was supraorbital

neuralgia, and sometimes the pain was reflected behind the ear and to the roof of the mouth. Exenteration of the ethmoids and opening of the sphenoids on both sides in January, 1920, again produced slight temporary improvement. A small amount of pus was at that time and at earlier operations found in the right ethmoid. The right disc was slightly pale and the arteries of this eye were a trifle narrow. There was no change in the left disc. The tonsils had been removed, and dead teeth extracted. Wassermann test and urine were negative.

DISCUSSION.—Melville Black, Denver, had seen the patient in December, 1919, at which time the vision in the left eye was 20/200, and the right the same as at present. At that time he advised removal of the dead teeth and the tonsils, and the use of eliminative treatment. The cause of the visual disturbance was probably retrobulbar neuritis, depending on a focal infection somewhere. The condition seemed to have a vascular relationship, because the proptosis was aggravated when the patient leaned over toward the affected side.

W. A. Sedwick, Denver, had reported a similar case before the society four years previously, the woman having a proptosis which was increased when she leaned toward the affected side. In that case a dentist pronounced the teeth negative. After a long vacation, the condition was very much relieved, but shortly after she started work again the symptoms returned. The nasal sinuses were found negative. Another dentist pulled a diseased tooth, and the patient had remained perfectly well since. Dr. Sedwick believed that there was still a possibility that a diseased tooth was responsible in Dr. Coover's case.

Postoperative Streptococcic Infection, Cured by Diphtheria Antitoxin.

D. H. COOVER, Denver, presented a man aged 59 years who two days after a straightforward cataract operation developed a severe streptococcic infection involving the area of the incision. The evening of the operation he had a

sneezing spell which caused him considerable pain, but the next day he was comfortable. The second night he had a severe attack of pain which lasted for several hours. Next morning, on removal of the bandage, the incision was found covered with an exudate which invaded one-third of the cornea. The anterior chamber contained some blood and strings of exudate, and the bulbar conjunctiva was very red. The following morning the general reaction was very severe, including chemosis of the conjunctiva. Without waiting for the result of a culture (which was subsequently reported to be streptococcic), the patient was given 5,000 units of antidiphtheritic serum, in addition to the treatment already employed, namely atropin, bichlorid of mercury ointment, and hot fomentations. Fifteen hours after the injection of the serum, the eye was a great deal better, and in twenty-four hours after the injection the cornea had regained most of its luster and the infection seemed to be arrested. Forty-eight hours after the first 5,000 units, the patient was given another 1,000 units which seemed to have no further effect on the exudate. In view of the rapidity with which the beginning panophthalmitis was arrested, Dr. Coover believed that he might have saved the vision if he had given the serum when the infection was first observed. It was possible that the exudate might still become absorbed.

DISCUSSION.—Melville Black, Denver, doubted whether the eye would ever be of any value, altho if it became perfectly quiet operative procedure might give a slight amount of vision.

Edward Jackson, Denver. The specific action of the serum in these cases depends upon the proteid content of the serum, which produces immune bodies in the patient. Sterilized milk is being used for the same purpose. Recent animal experiments by an American ophthalmic surgeon seem to indicate that injection of sterilized milk has a beneficial influence on inflammations of the eye.

H. R. Stilwill, Denver, who had seen the eye a number of times, said that in the beginning it looked a typical picture of panophthalmitis. The rapidity of improvement was striking from day to day.

W. C. Finnoff, Denver, pointed out that it was not the number of antitoxic units injected but the quantity of serum employed that determined the production of immunity.

Amblyopia of Pregnancy.

C. O. EIGLER, Denver, presented a woman aged 24 years who had become completely blind at eight and a half months of her first pregnancy. There had been swelling of the legs, hands and other parts of the body from the seventh month. Two convulsions occurred before Caesarian section, which was done on October 30, 1919, three days after the onset of blindness. The vision steadily improved. On December 11 it was R. 5/30, L. 5/60, and on January 8, 1920, R. 5/15, L. 5/30. There had been a good deal of hemorrhagic exudate, which had gradually disappeared. At the time of report there were no hemorrhagic areas in the fundus, but there were white streaks between the disc and the macula of the right eye.

DISCUSSION.—Melville Black, Denver. The optic nerve is white and the vision poor. She evidently had an albuminuric neuroretinitis. There are some permanent changes in the eye grounds.

Retinal Tuberculosis.

W. C. FINNOFF, Denver, presented a woman aged 33 years whose ocular changes had included blurring of vision of the right eye, slight vitreous haze on the temporal side, and in the macular region a flat white exudate and a finely granular hemorrhage into the retina about one and three-quarter disc diameters across. When these conditions were noticed at the first consultation on October 16, 1919, the vision was R. 0.8, L. 1.2. The lower temporal vein was distended. To the extreme temporal side of the fundus an area of white exudate covering one of the peripheral branches of the lower

temporal vein could be seen thru the vitreous haze. The lower portion of this exudate was bordered by a narrow hemorrhage, and another similar exudate was seen just above the first one, covering one of the terminal branches of the upper temporal vein. The vitreous had remained hazy on the temporal side of the disc until the time of report. On December 6, 1919, an oval patch of yellowish exudate was noted on the optic nerve in the region of the physiologic cup. This was later replaced by a small band of retinitis proliferans which extended on the temporal side to the inner border of the macula. No distinct change had occurred in the left eye. The patient had always been perfectly well. Urine and Wassermann tests were negative, as also were examinations of the nose and tonsils. There were several unfilled root canals, but no evidence of apical abscesses or granulomas around the roots of the teeth. The case had been treated with small doses of tuberculin.

DISCUSSION.—E. R. Neep, Colorado Springs, suggested that it was advisable to give a large dose of tuberculin to determine the presence or absence of a tuberculosis reaction.

Melville Black, Denver, advised the beginning of tuberculin in therapeutic doses, but also believed that there was a possibility of focal infection from the teeth, and thought that the most suspicious tooth should be extracted and cultured to determine whether the streptococcus viridans was present or not. If it were, all the teeth whose root canals were not filled should be removed.

Dr. Finnoff replied that the simple finding of streptococcus viridans would not give valuable information; but that it would be necessary to culture the bacteria by the technic of Rosenow to determine the proper oxygen tension under which they would grow. Then if growth occurred, the bacteria should be injected into animals, and if the corresponding disease was produced experimentally in the animal, this could be regarded as demonstration of a like etiology in the patient.

Venous Aneurism in Retinal Arteriosclerosis.

W. C. FINNOFF, Denver, presented a man aged 70 years whose vision had been good until five months previously, when he had got up one morning unable to see out of either eye. Vision had gradually improved, and at the time of report was R. 5/60, L. fingers at one foot. There had never been any pain in the eyes. There were slight lenticular opacities in each eye, and marked arteriosclerotic changes in the vessels of the fundi, including new-formed vessels over both discs, three apparently venous aneurisms along the upper temporal vein of the left eye, between two of which ran small vessels probably representing collateral circulation.

Eye Injury from Explosion.

W. C. BANE, Denver, presented a boy aged 12 years whose right eye had received perforating injuries thru the cornea and sclera from the explosion of a .22 caliber rifle. The vision of the eye was reduced to light perception. Displacement of the iris inward, in the lower nasal quadrant, gave the appearance of an iridectomy. The lens was cloudy. One fragment of glass had been removed from the

cornea, and another piece had come out spontaneously.

Arteriosclerotic Changes in Retina.

W. C. BANE, Denver, presented a man aged 56 years, who had come complaining that for the past two years the vision of the left eye had been failing. The vision was R. 5/15, L. 5/60 part. He stated that with the left eye he could only see the left half of anything he looked at. The right fundus was normal and the vessels good. In the left fundus the disc could not be seen, being concealed by a web of newly formed, bright red vessels, which anastomosed freely, and extended upward from above the center of the disc for two disc diameters, having about the same extent laterally. In the upper central portion of the fundus were three vertical flame-shaped hemorrhages. The inferior temporal vein curved sharply twice about two disc diameters below the center of the fundus and then projected forward into the vitreous like remains of the hyaloid artery. The urine showed sugar, albumin, and hyalin and granular casts.

WM. H. CRISP,
Secretary.

ABSTRACTS

Gallemaerts, E. and Kleefeld, G. **Microscopic Study of the Living Eye, The Cornea.** *Ann. d'Ocul.*, 1919, v. 156, p. 641, v. 157, p. 89.

The authors describe the method of examining the eye by means of the corneal microscope of Czapski and the Gullstrand Nernst slit lamp. These instruments are illustrated, as is the method of their use. Three forms of illumination are used; (1) direct, upon the spot to be examined; (2) indirect, where the light is direct upon an area near the spot to be examined; (3) reflection from a deeper surface, the objects in front appearing in black.

Their second article describes the normal and pathologic cornea under 15

heads, with additional matter to appear in a subsequent paper. Twelve very interesting illustrations, six of which are colored, accompany the present article.

(1) CORNEA. — Arachnoidean corpuscles are found thruout the parenchyma, but no connection can be established between their prolongations. Descemet's membrane seems a homogeneous layer. At the corneoscleral junctions, processes pass from the sclera into the cornea, frequently accompanied by a blood vessel. The nerves lose their myelin sheath at the limbus, and pass centrally, terminating immediately below the corneal surface. It is necessary to oscillate the

illuminating apparatus in order to follow them, as their visibility varies. In old people, the epithelium seems somewhat granular in the periphery, and the whole cornea is more opaque. The corpuscles, however, are more distinct. The arcus senilis is due to the presence of numerous granules at different levels. Often, ruptures of the epithelium and slight depressions are seen.

(2) **KERATITIS IN GENERAL.**—(a) *Edema of the cornea.* Of this there are two varieties, one due to inflammation, the other to uveal conditions. In the former, the corpuscles become more distinct. Often the whole cornea becomes so opaque that nothing can be seen. In the latter, there are vesicles which may be caused simply by circulatory disturbances in the anterior segment of the uvea. They are of variable sizes, circular or polygonal, transparent, often only microscopically separated from each other.

(b) *Striae.*—These are found in a large number of uveal affections, on the posterior surface of the cornea, running in different directions. They are also present after any operation evacuating the aqueous, and are perpendicular to the section of the cornea. There are also pseudostriae, which lie very deep, have nothing to do with hypertension, but are rather alterations in the parenchyma corresponding to uveal inflammation.

(c) *Vascularization.*—Normally, vascularization stops at the limbus, but not in a manner as schematic as hitherto described. The vessels terminate in a double festooned collarette, one lying deeper than the other, which give rise to vascular branches radiately directed, in varying numbers, towards the center of the cornea. These branches are difficult to distinguish, since they may be confused with other structures present, viz., the terminations of the scleral lamellae, radiating lymphatics and limbal blood vessels. Often about 1 millimeter beyond the limbus are found radial, unbranching capillaries in the deep tissues of the normal cornea. In the pathologic conditions, there is an intensification of the above structures, with new formation of blood vessels in the inflamed area.

This intensification is divisible into 3 classes, (1) superficial, (2) mediate, (3) deep, each presenting special characteristics. (1) Superficial, vascular bundles are found on the cornea, or in it at various levels. They branch irregularly, and become more plexiform the more the condition, such as pannus, ulcer, etc., is accentuated. In the beginning the vessels are mere cords, containing no blood, nor could it be determined how vascular permeability was produced. These cords develop into loops, the neighboring ones anastomosing, but how this takes place could not be determined. Sometimes the process takes the form of a horseshoe with the convexity towards the center of the cornea. Even after the inflammation is cured, some vessels still remain. The blood column becomes irregular and capillaries develop which enclosed the blood vessels. In old wounds there is found a comet shaped, ochre-brown colored granular mass, which is the last stage in the transformation of the red cells.

(2) Mediate. This is initiated by pointed cords developing from the pericorneal loops, which contain no blood at first. Amastomoses develop in such a way that an irregular quadrilateral area is formed.

(3) Deep. This arises as the result of vascularization of an old exudate in the irido-corneal angle. From the root of the iris arises a wavy vessel which rapidly penetrates into the cornea in a very deep zone. It takes a sinuous course, giving off numerous tortuous branches. In the case of traumatism such a vascularization indicates phthisis bulbi.

(d) *Deposits* on the posterior surface of the cornea are (1) cellular and (2) noncellular.

(1) Cellular.—(a) White globules. These are grey or white homogeneous points, sharply defined, which are isolated or confluent. They are especially abundant on the lower part of the cornea, and also are found in the aqueous. They precede iritis.

(b) Sanguineous. These are best seen with direct light. They are found in the beginning of the inflammation as brick red, roundish disks, isolated, or as com-

compact masses in the anterior chamber, but may be hidden by fibrous deposits. They are found in trauma, syphilitic or tubercular iridocyclitis.

(c) Pigment. These are of brownish red color, due to the presence of pigment cells, are isolated or may be massed in deposits of considerable size, and are sprinkled with pigment cells and granules. They may be found on the lens.

(2) Noncellular. These are present in the form of fine irregular, and often crystalline detritus containing pigment, and sometimes cholesterol.

(a) Droplets. These give to the posterior surface of the cornea the appearance of glass covered with vapor, and are best seen by indirect light. They are of the same size and never superimposed, as leucocytes are, and are larger and clearer than leucocytes. They are found at the beginning of the inflammation and are probably due to changes in the endothelium.

(b) Fibrillae. These look like strands of cotton and are found in syphilitic and tubercular iritis and in parenchymatous keratitis.

(c) Stars. These are formed by collections of (b).

(d) Granules. These are formed by condensation of filaments, and contain leucocytes and pigment cells. They form nodules of various sizes. One form is characteristic of tubercular iritis, and is a greyish, fatty looking area formed by concentric strata of different ages, thickest in the middle, and never pigmented.

(e) Powder. This is a delicate, greyish, ill defined area, the granules of the same size, developing around foreign bodies. These various deposits are found associated in varying degrees and their numbers have no relation to the disease.

(3) ACTION OF DRUGS ON THE CORNEA. (a) Cocain. About 15 minutes after the instillation, the entire thickness of the cornea is invaded by opacities in the form of points or even spots, of a greyish or light yellow color, sometimes circular, sometimes irregular, of varying sizes, involving especially the middle and posterior portions of the cornea. It is a phenomenon of inhibi-

tion, affecting chiefly the intercellular substance.

(b) Holocain. This causes opacification involving chiefly the arachnoidean substance. Following the use of the tonometer, distinct, concentric striae appear in the epithelium at the place of application, which persist for some time.

(4) CORNEAL ULCERS. The lesions are practically those found by pathologico-anatomic examination.

(5) EPITHELIAL DYSTROPHY. The appearance is similar to edema of the cornea. There are epithelial prominences similar to herpes corneae, which rupture and assume varied appearances. The cornea does not show infiltration. It is usually the first stage of the following condition.

(6) LYMPHATIC KERATO-CONJUNCTIVITIS or PHLYCTENULOSIS. The nodules are transparent and homogeneous. Around this is an area of infiltration of the entire thickness of the cornea, consisting of small white spots. The cornea is never involved beyond this area.

(7) HERPES CORNEA.—There are three stages:

(a) Invasion. The lesion is one of the substantia propria with secondary involvement of the endothelium. There is extreme congestion of the iris and edema of the cornea. Vesicles of varying size and of a general polygonal shape are found, surrounded by an area of extremely severe edema formed of an interrupted succession of small grey to white points, which radiate into healthy tissue. At the site of the ulcer, there is a slight recession below the surface of the cornea, and an amorphous exudate thru which the corneal tissue seems greyish and sprinkled with points, which give a darker appearance than the surrounding cornea. The epithelium rolls upon itself but presents no changes, while the margins of the ulcer present a series of rectangular segments. The endothelium is greatly altered. There are false striations of the posterior surface of the cornea, with regular fissures running in every direction, their number being independent of the epithelial lesions. The process is a trophic one, the improperly nourished epithelium and endothelium dying and being cast

off, permitting inhibition of the lamellae.

(b) Active stage. This exhibits new vesicles and ulcerations with exaggerations of previous lesions. This congestion increases and deep vessels invade the marginal zones of the cornea while superficial invasion takes place in every direction.

(c) Stage of repair. The edema and striae suddenly disappear, the cornea being entirely transparent except in the ulcerated area, where the epithelium gradually covers it, leaving a typical scar.

(8) SUPERFICIAL PUNCTATE KERATITIS. In this condition the epithelium is elevated by opacities, becomes ruptured and gives rise to microscopic ulcers.

(9) VERNAL CONJUNCTIVITIS. With low magnification a vitreous mass is seen at the limbus, in a wavy line with numerous elevations, all independent of the corneal tissue, and separated by a transparent zone from a greyish zone. This mass under magnification shows, at its external border, turgescer conjunctival and episcleral vessels; which ramify in two different ways. Some run parallel to the surface; others run perpendicularly and terminate in an ampullary dilation—the blood spots of certain authors. At the internal border is a succession of extremely large vascular arcades. By moving the arm of the lamp a vitreous condensation can be seen around the vessels. Some of the arcades give off capillaries, some of which contain no blood.

(10) PARENCHYMATOUS KERATITIS. (a) Stage of edema. This lasts 8 to 15 days. There is an increase in the vascularization at the limbus. The edema involves the entire parenchyma and sometimes develops in a half a day.

(b) Stage of activity. This gradually develops and lasts a variable time. Very small capillaries develop in all layers, followed by disappearance of the edema near them and appearance of it in nonvascularized areas. In different layers appear small greyish

areas, ill defined, elongated, parallel to the surface. The arachnoidean corpuscles are not altered. The invading vessels are surrounded by a greyish sheath, clearly demarked from the corneal tissue nearby. This probably gives rise to the opacification of the cornea.

(c) Stage of clarification. This lasts the rest of the patient's life. It commences in certain areas while others are still in the stage of activity. It arises away from the vessels and especially in the superficial layers. By indirect illumination, a large number of vessels are seen, some empty, some containing blood. The tissue between the vessels is translucent. By oscillating the lamp, small nebulae are seen at different intervals. In the deeper layers, however, the opacities form a homogeneous area, limited by a delicate white aura. Recurrences present small, greyish, sharply marked areas, which are vascularized secondarily by long, superficial vessels, which do not branch before reaching the inflammatory foci. The preliminary edema is not present in recurrences.

(11) CORNEAL SCLEROSSES. (a) Sclerosing keratitis. The corneal tissue is whitish, and sprinkled with small white spots in every layer. Neither corpuscles nor intercellular substance can be seen. Blood vessels of the deep type are usually present. The tissue, while less transparent than corneal, is much more so than scleral. Blood vessels can be distinguished but not the lymphatics or corneal nerves.

(b) Corneal degeneration. Frequently a deforming pannus is present.

(c) Grill-like keratitis. Sometimes the tissue is opaque, sometimes transparent, even more than the normal cornea. The clear zones are separated by fibres which are resolved by the microscope into white points or plaques.

(d) Leucoma adherens. The superficial layers of the white area lie above a tissue as opaque as the sclera. It is surrounded by a zone infiltrated with white granules. The iris is reduced to a delicate film composed for the most part of centrifugal fibers. In the

pigmented variety brown granules are found below the epithelium.

(e) Band keratitis or lagophthalmia. The appearances are numerous, but all are characterized by irregularity of the corneal surface due to loss of substance. A new variety, called by the authors "dégénérescence cireuse," consisted of a whitish, amorphous, translucent zone, corresponding to the palpebral orifice, limited by epithelium rolled up like parchment.

(f) Disciform opacity of the cornea. There are a large number of small points in the epithelium. No edema of cornea, but opacification usually finely punctated, without corpuscles, is present, limited by a slightly irregularly curved line, concentric with the limbus. No vascularization and no intracorneal hemorrhage.

(g) Keratitis disciformis. There are four concentric circles formed of small greyish points arranged radially, beginning subepithelial but involving the whole corneal tissue. The circles were separated by transparent zones, less infiltrated.

(h) Gerontoxon. The alteration of the cornea is due to an infiltration of small whitish points, found in every layer of the cornea. The epithelium may show lacunae and the nerves are well seen.

(12) TRAUMATIC KERATALGIA. There is a fissure in the epithelium, probably extending to Bowman's membrane. Next to this is a transparent zone limited by a greyish border. Under the epithelium is a large number of microscopic vesicles, the site of detachment of the epithelium. The substantia propria shows no changes.

(13) COMMOTIO OCULI. The cornea is transparent. There are radial striae on the posterior surface, due to rupture of the epithelium, containing red blood cells and simulating blood vessels. Between them the blood cells are irregularly disposed. When the traumatizing body directly affects the cornea, lesions of the latter are present.

(14) SIDEROSIS. (a) Local. Following presence of foreign body, there is a very narrow opalescent area around it, with small greyish spots. Necrotic

tissue, clearly marked off from the healthy, is found consisting of a greyish white, vitreous, irregular mass, filled with spots and fragments. The surrounding cornea is sprinkled with greyish spots, whose number diminishes away from the foreign body. In the deeper tissues, the corpuscles are more marked. There are cylindric structures running parallel to the corneal surface. Still deeper, but within the cornea are very fine greyish spots.

(b) Generalized. The corpuscles are very distinct, and are lightly yellowish-brown colored, the intermediate substance showing no changes.

(15) KERATOCONUS. It is almost impossible to focus the light. When an opacity is present, it shows nothing unusual. Old infiltrates in the tissue can be seen. At a certain distance from the apex, a circle of reddish-brown color, is faintly visible. Descemet's membrane is folded, sometimes radially, sometimes concentrically.

C. L.

Snell, Albert C. Compensation for Ocular Injuries. [New York State Journal of Medicine, July, 1919, p. 277.]

The object of the paper is to suggest a method by which compensation for ocular injury may be computed accurately and scientifically. Since the law definitely fixes the rate of compensation for total loss of vision in one eye or both, the opinion of an ophthalmologist is necessary only when there is partial loss of vision. In order to determine such percentage of vision remaining, only a scientific standard of measurement should be used.

Normal vision comprises, essentially, three easily separable functions: The first is that of detail perception, commonly called visual acuity; the second allocation or peripheral vision; and the third is binocular vision. The first two elements of vision are mutually dependent, altho they may functionate separately, and since they are mutually dependent are of equal value. Binocular function is determined by the relative loss of efficiency to the workman whose occupation requires a

good sense of distance and depth; and the great weight of authoritative opinion and experience fixes the value of binocular vision at 20%. Therefore, if central vision "C" is placed at 100, field vision or "F" would be 100 also, being of equal value, and consequently "B" the unit of binocular vision (being 20% of the whole) would be 50; hence $C+F+B=250$ total.

Each essential factor of vision is reckoned on an accurate percentage basis so that any partial loss of one or more of these elements may be determined. Central vision is measured with the Snellen standard, and the result expressed in a decimal, such as $20/30=.66$. When the disability involves both eyes the central visual acuity for each eye should be measured separately.

The field of vision can be determined in any of the accepted ways. For defining the limits of the field appropriately-sized objects should be used (20 mm.); whilst for the determination of the more central areas, smaller test objects should be employed (3 to 5 mm.). Any defect of the field, scotomata both relative and complete, should be measured and charted. Field vision is expressed in a decimal and is determined in the following way. The normal field of vision extends from the point of fixation upward 60° , nasalward 60° , downward 70° , and templeward 90° ; the entire field has a radial width of 70° . Therefore the radial width of any part of the field remaining after partial loss, or its equivalent in concentric area, is the numerator, and 70 is the denominator. Thus the percentage loss in a field which has a contraction of 20° equals $20/70$ or 0.285.

In determining the measurement of the binocular factor we are guided by certain facts. The following conditions being present there is a total loss of binocular function: First, when eyes constantly squint whether convergent, divergent or vertically separated. Second, when a difference of 0.70 or more exists between the visual acuity of the two eyes (visual acuity to be determined with the use of proper correcting glasses). Three, when the

vision in one eye is less than 0.1. Binocular vision and good depth perception may be assumed to be present, when the refraction is equal in both eyes and when there is no squint, provided the vision of one eye is $1/10$ or more. "With the unilateral reduction of the visual acuity to not less than $1/6$ ($20/120$) in one eye, good binocular vision may be assumed without special testing."

By the use of data thus obtained, which give measurement of value for each of these three elements of vision following any partial loss to one or more of these elements, the exact proportion of the vision which remains after ocular injury may be accurately computed. Example: A small central corneal scar with visual acuity $20/40$ or .50, without disturbance of the field and with but loss of binocular function: $C=.50$, $F=100.$, B 50, a total of $200 \div 250=.80$, the amount of vision remaining. The amount of vision lost in this example must then be 20%.

C. H. M. and W. B. D

Bonnefon, G. The Yperized Eye.

Ann. d'Ocul., 1919, v. 156, p. 577.

Under this title, the author describes his experience with eyes which had been affected by *dichlorethyl sulphat*. He distinguishes 3 periods: (1) The initial or irritative, (2) period of retention, (3) terminal.

(1) This stage may be delayed several hours. There is hyperemia of the conjunctiva, less pronounced than in the case of chlorin gas, and the pain present is less severe. There is a clonic contraction of the orbicularis. The patient walks with his hands covering his eyes. The cornea is *never* involved.

(2) This stage develops over night. The patient awakens blinded, owing to edema and infiltration of the lid and conjunctiva and the exudate from all the glands of the lid and cul de sac. The lids are glued together by the exudate upon the margins of the lid, which rapidly dries and mats the cilia together. The culs de sac are distended with fluid, and the ball is bathed in a mixture of tears, exudate and debris.

The picture is exactly that of a purulent conjunctivitis in the edematous stage. On attempting to force the lids apart, a yellow fluid spurts from between them, followed by a cry of pain from the patient and the forcible contraction of the orbicularis. Opened by gentle means, the cornea is seen to be intact.

Drawing the lids away from the ball, the conjunctiva of the latter is seen to be of a wine red color, with a distinct line of demarcation where the margins of the lids touch the ball, more pronounced below than above. This injection gradually fades away inferiorly so that the horizontal meridian seems to be outlined by two bands of anemic conjunctiva. These bands diminish rapidly in size, terminating long before reaching the canthi. The culs de sac are intensely injected and edematous. This edema may extend on toward the reddened area of the bulbar conjunctiva, along the palpebral orifice, so that a chemotic area is inserted sometimes between the lids and becomes caught.

(3) After 24 hours of compresses and lavage, with careful toilet of the cilia, the eye is greatly improved, only the hyperemia, lacrimation, and photophobia persisting, until in a week the patient is convalescent. In severe cases, however, the symptoms persist, and the photophobia and lacrimation are accentuated. The meibomian glands secrete to such an extent that the margins of the lids appear to be covered with zinc oxid ointment. Hordeola and chalazia appear, the latter having a marked tendency to suppurate. These conditions, especially the photophobia and lacrimation may last weeks.

Corneal involvement in man never takes the form of a burn, but always of a keratitis, and is due to microbic invasion during the second stage, when the retained fluid causes maceration of the corneal epithelium. Another cause is the anesthesia of the cornea caused by instillation of cocain, according to official orders. Corneal involvements take the form of (A) simple ulcer, (B) circumscribed abscess of the cornea, (C) hypopyon

keratitis, (D) pneumococcic serpigenous ulcer.

In only one case in 30,000 was there hypertension.

TREATMENT. First stage—liberal and frequent lavage. Hot compresses for the pain. Second stage—frequent lavage to remove retained fluid and cleansing of the cilia. Avoidance of all collyria, especially cocain. Third stage—alkalin douches have no effect, and isotonic, and bicarbonat solutions seem to accentuate the irritation. Cocain and adrenalin are temporarily palliative. The best results were obtained by the author with a mixture of saturated aqueous solution of sodium sulphat 800 gr., syr. simple. 200 gr., with which the eyes were bathed for ten minutes, 2 to 4 times a day.

C. L.

Coblentz, W. W. Comparison of Photoelectric Cells and the Eye. American Journal of Physiologic Optics, vol. 1, p. 41.

The explanation of physiologic phenomena by chemical and physical reactions appears so plausible that it is needful to observe extreme caution in accepting such explanations. Coblentz considers the human eye as a radiometer, giving in graphic form the relative sensibility of the eye to light of different colors, the comparative sensibility curve of 125 observers, and the sensibility curves of four color blind subjects.

He also considers the photoelectric cell as a radiometer, including: variations of photoelectric current in molybdenite with time of exposure; the distribution of energy of a gas-filled tungsten lamp, measured at different points in the spectrum with the photoelectric cell and with the thermopile; and the photoelectric sensitivity of calcium, and rubidium compared with that of the average eye.

Coblentz finds that in the gas-ionic photoelectric cell, the response of the negative electrode, when exposed to light, is vaguely analogous to that of the retina of the eye. But the spectro-photoelectric responses or sensitivity curve has its maximum, if any, in the

extreme violet where the eye is quite insensitive to radiation; and the shape of this sensitivity curve is only very vaguely similar to the sensibility curve of the eye. The possible "aftereffect" similar to the persistence of vision, which occurs after exposure, needs further and very careful investigation to make certain that there is such an effect.

Spectro-photoelectric sensitivity in solids, shows that like the eye, they are selective as to wave length and intensity. But the maximum response to radiation stimuli occurs usually in the extreme red, or even far out into the infrared; and there is no similarity to the visibility of radiation curve of the eye. Considered as a whole the phenomenon of spectro-photoelectric sensitivity in solids is only vaguely, if at all, similar to the visual response.

Combining the gas-ionic, spectro-photoelectric responses with that observed in solids does not give us a composite effect which is analogous to the selectivity of the eye (1) to the rate of response, or (2) to the intensity, and (3) to the wave-length of the exciting light. Neither does persistence of vision, color of after images, etc., which obtain in the eye, have a counter-part in photoelectric sensitivity.

"In the writer's opinion, evidence is not sufficient to conclude that there is a connection between the phenomena of color and brightness perception, and the phenomenon of photoelectric sensitivity of inanimate material."

E. J.

Guglianetti, Luigi: A New Synchiotome. *Archivio di Ottalmologia*, v. 26, 1919, p. 235.

The author describes a knife devised by him to separate irido-corneal synechiae, especially where the lens capsule is involved, when these are too extensive for the use of Piccoli's smaller knife. It consists of a stem and blade set at an obtuse angle on the handle. The blade is slightly sickle shaped at the end, with both concave and convex edges sharpened for a distance of 10 mm. The stem is thin and of equal

width so as not to separate the lips of the corneal wound. It thus prevents the chamber from emptying. The blade is introduced opposite the synechia, and by turning it laterally a cut is first made with the convex edge. Should this not separate all the fibres, the blade is turned back, when the slightly hooked concave end will engage and cut the remaining fibres.

The blade is wider and stronger than a Graefe knife, and its double edge and shape would seem to give it some advantages in certain cases.

S. R. GIFFORD.

Bollack, J. Papillary Stasis and Dilatation of Ventricles in Cerebral Tumors. *Ann. d'Ocul.*, 1919, v. 156, p. 538.

The author reviews 27 cases of brain tumor from the above standpoint. Twenty-three cases were associated with choked disc, the location of the tumor being 7 cases the convexity of the brain, 14 cases the posterior region and 2 cases the lateral ventricle. Four cases did not show this symptom, being located 1 on the convexity, 1 in the posterior region and 2 central. So far as dilatation of the ventricles is concerned, in 15 cases located in the posterior region, the third ventricle alone was dilated 6 times, in combination with the lateral ventricles 8 times, and neither once. In 8 cases located on the convexity, there were 4 cases of dilatation of the third, 1 of the lateral ventricle, and 3 of neither.

In 2 cases located in the ventricular region, there was 1 case of combined dilatation of the third and lateral ventricles, and 1 of the lateral alone. In 2 central tumors, there was 1 case of dilation of the lateral alone, and 1 of neither.

Accordingly, it is possible to say: that dilatation of the third ventricle is always accompanied by choked disc, and the converse is usually the case. Dilatation of one or both lateral ventricles is accompanied by choked disc only when the third ventricle is also dilated; and it is accompanied rarely by choked disc, when it alone is present. In 20 cases of choked disc, the

foramen of Monro was dilated unilaterally 3 times, bilaterally 12 times. This dilatation which was sometimes considerable, was always accompanied by dilatation of the third ventricle, and often by that of the lateral ventricles. The latter was always accompanied by dilatation of the foramen of Monro, but the former not necessarily. The aqueduct of Sylvius was altered in 16 cases out of 20 of choked disc. Sometimes it was obstructed by the tumor, sometimes flattened out by compression, but usually dilated.

Relation of the duration of the choked disc to the degree of dilatation of the ventricles was:

(1) Stasis 15 days to 3 months—5 times none, 3 times isolated dilatation of third, 1 of both lateral.

(2) 4 months to 1 year—3 times dilatation of the third ventricles and foramen of Monro.

(3) More than 1 year—a generalized dilatation was found in 4 cases out of 9.

There seems to be a sequence of dilatation, dependent on the duration and the intensity of the hypertension. This increase of tension is a physiologic condition due to disturbance in the equilibrium between the subarachnoidal and ventricular tension. This in turn may be due to increased production of the cerebro-spinal fluid, due to inflammation, or to interference with the absorption of the fluid, or to interference with its circulation. The clinical manifestations include the hypophyseal syndrome, radiographic findings, lumbar puncture findings, ventricular puncture.

The author briefly discusses the various theories concerning choked disc and then gives an embryologic, anatomic and histologic discussion of the relation between the third ventricle and the chiasm. He concludes from the clinical or anatomic demonstration of the constancy of ventricular hypertension, on the one hand; and from the intimate embryologic, histologic and anatomic relations between the third ventricle and the chiasm, and the direct influence of lesions of the former upon the latter, on the other hand; that ventricular dilatation plays a preponderant role in the production of choked disc.

C. L.

Bourgeois, A. Simple Procedure for Extraction of Traumatic Cataract. *La Clinique Ophthalmologique*, 1920; IX, 107.

He reviews his technic in this article and calls attention to his previous articles, one read before the French Ophthalmological Congress of 1909 and another in 1913. His present article was inspired by the excellent results obtained by Darier who is using the technic for the removal of the lens in high myopia.

The author's technic is a linear extraction, in which he uses a narrow keratome bent at an angle of about forty-five degrees. He utilizes four or five scoops of the Daviel type. As one fills up with the lens material he milks out a certain quantity, then another scoop is used. He does not perform an iridectomy and claims his results have been very gratifying.

T. J. DIMITRY.

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HOSPITAL STANDARDIZATION.

The medical press has devoted considerable space of late to the problems of "hospital standardization." Even in some of the largest cities, hospitals have been found where little or no attempt has been made to bring the standard up to the average. In the smaller cities the chief complaint has been poor equipment, lack of laboratory facilities, absence of case records of any value.

Hospital standardization means two things—a proper diagnosis and treatment and a proper record of this diagnosis and treatment. To obtain these it is essential that the hospital furnish the equipment and the physician the inclination to make use of this equipment.

Ophthalmology has always stood at the apex of advanced medicine. Its importance as a specialty cannot be minimized when its broad application to medicine, especially in diagnosis, is considered. With a few exceptions, ophthalmology, as practiced in America, is not by any manner of means as high class as it should be. Visit our best clinics and watch the operations.

Do you hear a complete report on the blood, the urine, the general physical condition of the patient before operation? Do you see roentgenograms of the teeth, the laboratory report on the flora found in the smear of the conjunctiva? In glaucoma operations, have you heard the operator report on the metabolism, the kidney function, the blood pressure? In squint operations, has the muscle strength been tested? In cataract operations, do you hear anything about possible etiologic factors? And so on.

How many clinics bring in a series of cases such as glaucoma, iritis, cataract, choroiditis, even conjunctivitis and keratitis? Medical cases surely exist in these centers. Possibly the visiting surgeon does not care to see such cases, but certainly they should be shown.

If this is true in the larger centers, what shall we say of the smaller centers and of the hospitals where no teaching is attempted?

Group medicine has improved conditions somewhat; but so few members of the profession are associated in group practice, that one need not con-

sider that feature as of present benefit. Ophthalmology is probably cleaner in all respects (barring of course the glass problem) than any other specialty, chiefly because most hospital cases are surgical. Medicine, however, is the great field for future advancement in ophthalmology, and with hospital facilities furnished, great strides in this direction may be confidently expected.

What has all this to do with hospital standardization? Just this: In the standardized hospital the case record of the specialist will be reviewed by surgeons, internists, or specialists in another branch. A man will not be permitted to operate indiscriminately on any sort of case, unless he can show the reason and justification of operation. He will have to show what condition is present in a given case. In other words, the time is at hand when he will be checked up on his work.

This will apply to the internist who fails to have the eyes examined when essential for a diagnosis, or the surgeon who neglects a Wassermann or ocular examination in brain cases, or the mastoid case that goes wrong. The light of investigation is beginning to shine. We, as ophthalmologists, will again lead the way if we but seize this opportunity to aid in diagnosis, aid in technic, aid in criticism of poor methods and habits. Are we equal to the occasion? Membership in the various societies, certificates of efficiency or degrees in ophthalmology will not be sufficient protection for the man who fails to meet the requirements of the standard hospital. Each must stand upon his own legs and answer for his success or failure. This, then, offers to the medical profession something that has never before been possible—individual responsibility.

G. W. SWIFT.

A BASE LINE FOR OCULAR MEASUREMENTS

It has been customary to refer the various meridians of astigmatism or the visual fields to the supposed horizontal line joining the centers of the two eyeballs, or of the pupils or nodal

points of the two eyes. If the eyes were fixed in position like a telescope such a reference to the horizon might be adequate and satisfactory. But the eyes are not fixed as to the relation of any such line to the horizon. What is called the horizontal meridian can be made horizontal by placing the head in a certain position, and is assumed to be horizontal when the head is in the "primary" position.

But in point of fact the head is very rarely in the primary position. Even when it is in that position in some persons a line joining corresponding points of the two eyes would depart considerably from the horizontal. The 180° or "horizontal" meridian to which we refer the axes of lenses, is only horizontal accidentally, and at best is a line difficult to locate, and still more difficult for any two observers to exactly agree upon.

In view of these facts attention should be paid to the suggestion of Dr. Olsho in this issue (p. 481), that a line which can be identified and exactly located on any face by any number of observers should be adopted as the practical base line, representing this theoretic 180° meridian and to this the different meridians of the eye should be referred. By a slight adjustment of the head it can be made strictly horizontal in any case; and when it is made horizontal the head will not depart materially from the exact "primary" position, except in a few cases. On the other hand, the practical advantage of taking a line that can be readily identified by either prescriber or optician will far outweigh any disturbance of our indefinite conceptions of a theoretic plane perpendicular to the long axis of the body, and therefore assumed to be horizontal.

To get full practical benefit from referring to the line joining the two outer canthi as the 180° meridian, there needs to be some general consensus with regard to this being meant whenever a record is made of the refraction; or a prescription for glasses written or filled. It would be proper to hasten the adoption of this standard meridian

by formal action on the part of larger associations of oculists, and its acceptance by similar organizations of opticians.

This plan of locating the 180° meridian would be of equal advantage in fixing the meridians for the field of vision. It would serve every practical purpose to recognize this line joining the canthi as the horizontal meridian, which could be made and kept horizontal as accurately as any theoretic line; and more easy to keep in position by simple inspection, than by any biting fixation or other elaborate method.

To adopt this suggestion does not necessitate the use of any special trial frame; altho Dr. Olsho's suggestions and arguments for the form he describes are worthy of close attention. Any trial frame can be distinctly marked with its 180° meridian, and then the essential thing is to see that these marks fall on the line joining the outer canthi, even by holding the edge of a card or ruler to them.

In similar fashion a marker can be attached to any perimeter that will enable the surgeon to accurately orient the patient's eye from time to time thruout the examination of the visual fields, with the certainty that any other day the eye can be brought to the same position.

E. J.

INTERNATIONAL CONGRESS ON OPHTHALMOLOGY

At the meeting of the American Ophthalmological Society, June 16th, the Committee from that Society to assist in planning for such a Congress made its report; which was approved, and the committee was continued to aid in carrying forward the arrangements proposed. Similar action was taken by the Section on Ophthalmology of the American Medical Association in April; and the Committee of the American Academy of Ophthalmology and Oto-Laryngology had already received authority to cooperate fully in the movement. The project is therefore fully launched, and its organization has advanced far enough to in-

vite the cooperation and support of ophthalmologists thruout the world.

Invitations will be extended to national ophthalmologic societies in countries with which the United States now has diplomatic relations; and to individual ophthalmologists thruout the world to cooperate in preparation for the meeting and to attend its sessions. American ophthalmologists are asked to take the lead in giving their support; and any who are planning to go abroad can assist in spreading information with regard to the meeting which is to convene in Washington about the end of April, 1922.

Applications for membership in the Congress should be sent, with the membership fee of ten dollars, to the Chairman of the Committee on Membership and Credentials, Dr. Walter R. Parker, David Whitney Building, Detroit, Michigan. Suggestions regarding topics to be discussed, and offers of papers or material for a scientific exhibit, should be sent to the Chairman of the Committee on Scientific Business, Dr. Edward Jackson, 318 Majestic Building, Denver, Colorado.

The Chairman of the Committee on Organization, Dr. Edward C. Ellett, of Memphis, Tenn., will be assisted by members of his committee representing different sections of the United States, and other American countries. This Committee will be completed as rapidly as possible, and its membership announced later. Dr. William H. Wilmer, of Washington, D. C., has been made Chairman of the Committee of Arrangements; and Dr. Lee Masten Francis of Buffalo, the Chairman of the Committee on Finance. Thru the latter, financial support apart from the fee may be tendered. It is proposed to remit the dues of those from outside of America who make the journey to attend the Congress; and to furnish the Transactions to foreign members at cost. To properly carry thru the work of the Congress, and entertain in a fitting manner our foreign guests in this era of high prices, will require both a large membership in America, and additional

nancial assistance from those who can give it.

The time for preparation is short enough. Let us push forward as rapidly as possible along the lines indicated in our previous reference to this subject, page 384 of our May issue.

E. J.

SUSPENDED JOURNALS

In its issue for May-June, 1918, the *Centralblatt für praktische Augenheilkunde* referred to the consolidation of ophthalmic journals in England and America that had occurred during the war. Then it rehearsed with evident pride the list of seven German periodicals devoted to ophthalmology, all of which were being continued. But with the December, 1919 number, the *Centralblatt*, itself, suspended publication after a career of 43 years, giving as the reason the enormously high cost of paper and printing which had increased 475 per cent since the beginning of the war, and was still rising.

At the close of the war it was announced that the publication of "Nagel's Jahresbericht," which had been suspended since 1914, would be resumed, and that a single volume covering the period of the war was in process of preparation. Now we are informed that, when this volume has been issued, the publication of the *Jahresbericht* will be given up, after serving the profession for a period of 44 years. It has been urged that our own Ophthalmic Year Book [which is now sent out under the title *Ophthalmic Literature* to meet the views of the Post Office Department in regard to the naming of periodical publications entitled to second-class entry] should assume more nearly the form of the defunct "Jahresbericht." But this is a matter that requires further consideration and discussion.

Whether the giving up of an ophthalmic journal is to be desired depends on the purpose of the journal, and the view that is taken of its importance. If a journal is published as a memorial to some man, like Graefe's *Archiv*, or to furnish opportunity to a

certain group of men to get their papers published, as are certain sectarian medical journals, or to advertise a particular institution or medical center, the continued publication of the separate journal is essential to the purpose. But if a journal is intended to furnish its readers with the widest and most complete survey of the literature in which they are interested, mergers and consolidations are in every way desirable. Because in this way it is possible to avoid duplication, systematize the literature that must be consulted with reference to any particular point, effect economy in the production and distribution of the literature, and strengthen the combined journal, so that it may be fitted to supply a higher grade of service.

E. J.

CONDITION OF OPHTHALMOLOGISTS ABROAD.

The condition of affairs with our special part of the medical profession, in the former enemy countries, is very bad indeed. But, perhaps not as terrible as that of the general populace. According to recent correspondence, the physicians and their families have suffered the effects of improper diet, with the rest.

Dr. M. Ohlemann of Wiesbaden, writes May 9, 1920, of the effects of malnutrition—the "blockade disease," as they denominate it—causing rachitis, even in the old, as in the case of his wife, who suffered fractures of the femur and clavicle, simply from turning over in bed.

Dr. J. Fejer of Budapest, writes May 8, 1920, of the pitiable condition of the hospitals, with no absorbent cotton, antiseptics or bandages; the impossibility of obtaining cocain, atropin, pilocarpin, or nitrat of silver; and earnestly desires contributions for his poor patients, who go blind in his hands without the materials for relief.

Prices are very high. A pair of spectacles now costs five to six hundred crowns. "Happy U. S. people who know nothing of such a life and who

do not have to share this miserable lot."

Others of our correspondents have succeeded in getting away from their homes, like Professor Fuchs of Vienna, leaving most of his possessions, who is now in Spain; earning his bread by giving lectures, where at least the bread is nutritious and not a substitute ("ersatz") product. H. V. W.

BOOK NOTICES

Card Test for Color Blindness. F. W. Edridge-Green, M.D., F.R.C.S. London: G. Bell and Sons, Ltd.

This test consists essentially of 24 cards printed in colors and eight pages of explanatory text, the whole included in a neat pocket case, 5¼ by 6 inches in size and one-half inch thick. It is offered as a simpler and less expensive test than its author's color lantern.

On each card are printed splotches of the colors in different shades and tints. The patches of color have the same shape and arrangement on all the cards. The colors chosen for each card are those which the sufferer from some variety of color blindness will confuse. One of the colors is arranged so as to form a letter, the other color constitutes a back-ground. There is no way to recognize the letter except by the differences of color.

One card after another is shown and the failure to see the figure against the background of confusion color indicates the particular form of color blindness that card is designed to disclose.

As a cheap, portable and apparently reliable test this one is most welcome.

E. J.

Anneseley Burrowes. What it is Like to be Blind.—Saturday Evening Post, Mar. 13, 1920.

All who have not, are recommended to read this article in the original, as an insight is there given from the patient's side of the sensations from the loss of sight, and of the gradual development of the blind man's senses. It is written by a gifted writer, a student of human nature, and a philoso-

pher who has accepted his calamity in a remarkable spirit; and not only makes the best of the senses he has left, but has achieved an enviable position in his profession of writing.

Mr. Burrowes had a high degree of myopia in both eyes. His father and mother were evidently very myopic, and he thus came by this condition naturally. One of his eyes suddenly went blind while in a boat which he used as a work shop. The patient was using a typewriter when "something thick and green edged out like a drop-curtain taking two hours to fall. The color faded out, becoming gray with occasional lapses into other colors and he never saw out of that eye again." This was probably a detachment of the retina, happening as it does in about fifteen per cent of highly myopic cases. He went along with the other eye for a number of years, the sight gradually becoming poorer from the development of lenticular opacities, undoubtedly associated with degenerative changes in the fundus.

When his sight became very poor, he submitted to an extraction of cataract in Chicago, evidently an expression in the capsule, which in the moment of operation was apparently a success; but when dressings were made the surgeon gave no hopes for sight. The patient submitted to a number of operations later, probably an attempt to make a pupil, but all with no result.

Of great interest is his description of his orientation to his new environment of practically total blindness, and of what he was able to do; how he got about, his sense of direction and of position of obstacles in his path. His experiences with other blind men, and his own happy description, show that the blind become content and lead a more happy life than others do with different afflictions. The deaf are customarily less happy and even morose, for they have a smaller world in connection with their fellow creatures; they cannot hear what other people are saying and they cannot communicate their thoughts as freely to others; whereas the blind are deprived of communication with their fellow creatures

practically only by the printed page, and they make up for this in part by the reading of Braille and by having people with sight read to them. On the whole this communication is not only an item of human interest but will give to the oculist a side light that he seldom acquires from his patients.

There are but few descriptions of blindness in literature; we may remember "The Light That Failed" by Kipling, and "The Lane That Hath No Turning" by Parker,—novels dealing in large part with persons who became blind thru glaucoma. — H. V. W.

CORRESPONDENCE

The Clinic of Col. Henry Smith.

To the Editor:

In August, I left Bangkok, Siam, where I had been practicing for a number of years, to pay a visit to the Clinic of Col. Henry Smith of India.

In September I arrived at Madras and called on Col. Kirkpatrick, who is now in charge of Col. Elliot's Hospital and Clinic.

I arrived at Amritsar about the first of October, and found Colonel Smith at home having just returned from the Front in Mesopotamia. The Colonel has two cataract seasons a year. One in the Spring just before the hot season sets in, beginning the first of March and lasting about eight weeks; and, another about the beginning of October to the middle of November.

During these two seasons the natives come in droves from all over the Punjab to be operated upon for cataract. During the two seasons the Colonel will do between two and three thousand intracapsular cataract extractions. Up to date he has done around 50,000 intracapsular extractions.

Colonel Smith is a Dublin University man and a fine scholar. He is an indefatigable worker and a great student. His hospital is an institution of 300 beds requiring considerable personal administrative attention. He has several native clerks, but his surgical staff consists of his personal assistant, Neuralai; one native surgeon and

a European nurse. The Colonel has a wonderful capacity for work. One day I saw him do 45 cataract extractions; 3 iridectomies, 2 trephinations for glaucoma and some general surgery. To prevent his work from piling up he operates every day except Sundays; from eleven in the morning until three in the afternoon. He has three tables in his operating room which are constantly in use.

The Colonel is also a general surgeon of very high ability and does not confine himself to eye surgery alone. I have seen him do three operations for stone in the bladder one afternoon besides his usual number of eye operations. He never uses the knife in operating for stone. He says it is barbarous to use the knife. He is most skillful in the use of the lithotrite. Nearly all of his stone cases go home the same day that they have been operated. One day he operated on two cases for extrauterine pregnancy. During my visit he did two Caesarean Sections. One forenoon he performed 3 postmortems. Hernia operations are one of his many specialties. I marveled at his versatility. He does everything. There is hardly an operation in the whole field of surgery that the Colonel does not frequently perform in his Clinic.

The Intracapsular Operation for Cataract has made him known the world over. He has aimed to make it the ideal operation for senile cataract. Upon these Indian natives it is the one ideal operation. There are no capsular remains. He seldom has a secondary or an aftercataract develop. His pupils are black and clear. He extracts a couched or dislocated lens with the same ease as an ordinary senile cataract. If there is any loss of vitreous he seldom has any bad effects. He removes the bandage for the first time on the ninth day and allows the patient to go home on the next day.

The Colonel operates upon his cataract patients immediately after they have been seen by him. The native of the Punjab will not submit to a lengthy preparation. If he were to be told to come into the hospital and wait

two or three days for preliminaries he would walk away and go back home. Knowing the natives of India and their poverty and superstition, one can readily understand why Colonel Smith operates upon them the very day they arrive.

He operates on both eyes at once; bandages the eyes, and then does not disturb the dressings by inspecting the wound on the second day, as is so commonly done, but gives the eyes nine days to heal up thoroly before he removes the bandage. He is too busy, and, again it would take hours of his time daily to inspect and change the dressings of all these cases. He strongly believes in giving the wound a good chance to heal up thoroly before disturbing the dressing for inspection. He is not ambidextrous but operates on both eyes with his right hand.

The patients sit upon the floor of the operating room by the score and await their turn. There are only a few preliminary preparations. The patients' lashes are trimmed. The parts are washed with soap. The conjunctival sacs are flushed with a stream of bichlorid solution 1-4000 from a jar about four feet overhead. He uses 3 instillations of 5% cocain solution. This is all the preparation the average patient gets.

The Colonel does not worry his patients with much conversation and orders to look up and down. He operates silently and finishes before the patient has had time to grow nervous.

As a teacher he is painstaking and thoro, and aims to teach his pupil every step of the intracapsular operation. Under the Colonel's guidance he is allowed to operate on the living subject. There are no pig's eyes for demonstrations. His Clinic is the only place where they demonstrate on the living subject.

Col. Henry Smith is one of the foremost men in the Indian Medical Service. His extensive work for the past thirty-five years has made him known throughout the World; but, none know him better than the native Punjabi, among whom he has lived as

friend and beloved physician all these years.

CHARLES C. WALKER.
Detroit, Mich.

AMERICAN BOARD FOR OPHTHALMIC EXAMINATIONS.

In addition to the list published in the January number (p. 74) the certificate of the Board has been granted to the following:

Bahn, Charles A., New Orleans, La.
Bordley, James, Jr., Baltimore, Md.
Brooks, Earl Brisbin, Lincoln, Nebr.
Brose, Louis D., Evansville, Ind.
Calhoun, James G., St. Louis, Mo.
Chance, Burton, Philadelphia, Pa.
Dimitry, Theodore J., New Orleans, La.
Dowling, J. Ivey, Albany, N. Y.
Ellett, Edward C., Memphis, Tenn.
Foster, Matthias L., New Rochelle, N. Y.
Gantt, L. Rosa H., Spartanburg, S. C.
Graham, R. Watson, Los Angeles, Cal.
Green, John, Jr., St. Louis, Mo.
Hardy, Wm. Frederic, St. Louis, Mo.
Heckel, Edward B., Pittsburgh, Pa.
Heggie, Norman MacLeod, Jacksonville, Fla.
Jean, George William, Santa Barbara, Cal.
Jobson, George B., Franklin, Pa.
Key, Ben Witt, New York City.
Kiehle, Frederick A., Portland, Ore.
Langdon, H. Maxwell, Philadelphia, Pa.
Lukens, Chas., Toledo, Ohio.
Lowell, W. Holbrook, Boston, Mass.
Lum, Clarence E., Duluth, Minn.
Mahoney, George William, Chicago, Ill.
McCool, Joseph L., Portland, Ore.
McMurray, John Boyd, Washington, Pa.
Mertens, Paul S., Montgomery, Ala.
Rideout, William Jacob, Freeport, Ill.
Satterlee, Richard H., Buffalo, N. Y.
Searcy, Harvey Brown, Tuscaloosa, Ala.
Snow, L. W., Salt Lake City, Utah.
Teal, Frederick F., Lincoln, Nebr.
Thomas, Jerome B., Palo Alto, Calif.
Vinsonhaler, Francis, Little Rock, Ark.
White, Joseph A., Richmond, Va.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities.

DEATHS.

H. B. Hill, of Logansport, Ind., died May 20th. He was 54 years of age and practiced ophthalmology and otolaryngology for over 25 years.

James H. Spencer, Tacoma, Washington, aged 58 years, for several years a specialist in the U. S. Indian service at Ashland, Wis., died at Santa Cruz, Calif., May 13th, from chronic interstitial nephritis.

SOCIETIES.

Dr. Verhoeff, of Boston, read a paper before the Louisville Eye and Ear Society at its June meeting, on "Some of the New Cataract Operations."

The Nevada State Medical Association will hold their annual meeting at the Tavern, Lake Tahoe, California, on June 25-26. An attractive program has been arranged and some of the leading men of San Francisco will take part.

The Chicago Medical Society and the Chicago Ophthalmological Society held a joint meeting on May 26th, at which Dr. Dwight Orcutt read a paper on "The Importance of Early Treatment for Strabismus," and Dr. Richard Tivnen, one on "Preventable Blindness," illustrated by lantern slides.

The Canadian Medical Association met this year on June 22-25, at Vancouver, B. C. The program of the Section on Ophthalmology and Oto-laryngology contained five papers on ophthalmologic subjects, two of which were on the use of radium. The morning of June 23rd was devoted to this session.

An Eye, Ear, Nose and Throat Section of the Buchanan County Medical Society was organized at St. Joseph, Mo., March 10th. Dr. P. L. Leonard was elected chairman and Dr. W. L. Kenny, secretary of the Section.

The Colorado Congress of Ophthalmology and Oto-laryngology will be held in Denver, Colo., July 23rd and 24th, 1920. The list of papers relating to Ophthalmology includes: "Delirium Following Cataract and Other Eye Operations," Wm. A. Fisher, Chicago, Ill.; "Hints in Relation to the Dynamics of the Extrinsic Ocular Muscles, with Suggestions as to the Treatment of States of Muscular Imbalance," John M. Banister, Omaha, Neb.; "The Value of Dental Examination in the Treatment of Ocular Disorders," Wm. L. Benedict, Rochester, Minn.; "Accidents Occurring During the Extinction of Cataract," H. W. Woodruff, Joliet, Ill.; "Iodin in the Treatment of Intraocular Hypertension, with Presentation of Tonometer," Edward J. Brown, Minneapolis, Minn.; "Some Optical

Imperfections of the Eye, and Some of Their Uses," Henry Sewall, Denver, Colo.; "Visual Fatigue," Edward Jackson, Denver, Colo.

PERSONAL.

Dr. A. G. Hovde, of Superior, Wis., who has been sojourning in California during the fall and winter, has returned to his practice at Superior.

Dr. E. M. Myers, of Wakefield, Kan., has removed to Superior, Wis., where he is now associated with Drs. Hovde and Smith.

Dr. O. Dulaney and Dr. J. D. Brewer announce their association in the practice of eye, ear, nose and throat diseases, in Dyersburg, Tenn.

Dr. D. L. Shaw, formerly house surgeon at the Royal London Ophthalmic Hospital of London, England, has located in Reno, Nevada.

Dr. Burton Chance, Philadelphia, has removed his office to 1305 Spruce street.

Dr. Nelson M. Black and Dr. V. A. Chapman, of Milwaukee, have dissolved their partnership and each will continue the practice of ophthalmology and oto-laryngology individually in the same city.

Dr. Wesley Hamilton Peck, formerly president of the ophthalmic section of the Illinois State Medical Society, was presented with a silver loving cup at the Rockford meeting in May as an appreciation of his efforts in behalf of the section. Dr. Willis O. Nance made the presentation address.

MISCELLANEOUS.

The Summer Course in Ophthalmology under the auspices of the Medical Department of the University of Colorado, began June 14th in the Medical Building in Denver. The course will extend over a period of six weeks.

The State Board of Health of Indiana has been advised that two men, Dr. Harper and Dr. Van Camp, are representing themselves as their agents. They are testing the eyes of children whom they secure in the name of the State Board of Health. According to Dr. John N. Hurty, secretary of the State Board, neither of the men is a representative of the State Board, and a warning is issued against them.

It is announced that the Centralblatt für Augenheilkunde, founded and edited by Prof. J. Hirschberg for forty-three years, is to suspend publication. Michel's (formerly Nagel's) Jahresberichte über die Leistungen und Fortschritte im Gebiete der Ophthalmologie is also to stop publication with 1920. The back numbers from 1914 are to be made up to the current year.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colo.

DIAGNOSIS

- Birley, J. L.** Medical Science Applied to Military Aviation. *Lancet*, June 12, 1920, p. 1251, 1257.
- Ferree, C. E., and Rand, G.** Visual Acuity at Low Illumination. Detection of Small Errors of Refraction. (4 ill.) *Amer. Jour. Ophth.* v. 3, p. 408-417.
- Gallemaerts and Kleefeld.** Observations with Gullstrand's Lamp. *Belgian Ophth. Soc.* Nov. 30, 1919. *Amer. Jour. Ophth.* v. 3, p. 364.
- Holloway, T. B.** Pupillometer. *Amer. Jour. Ophth.* v. 3, p. 381.
- Jackson, E.** Pseudo Tumors of Uveal Tract. (1 ill. 1 col. pl. Bibl.) *Amer. Jour. Ophth.* v. 3, p. 397-402, and p. 464.
- Koepe, L.** Findings with Improved Illumination of Eye. *Munch. med. Woch.*, v. 67, p. 39.
- Morse, S.** Fundus Examination as Evidence of General Disease. *New York Med. Jour.* v. 111, 1920, p. 1034-1037.
- Redding, L. G.** The Ophthalmoscope in Diagnosis and Prognosis. *Jour. A. M. A.*, v. 74, p. 1731.
- Ribon, V.** Differential Diagnosis of Menigitis by Eye Findings. *Siglo Med.* v. 67, 1920, p. 86.
- West, L. N.** Eye as an Aid in Diagnosis of Intracranial Lesions. *New Albany Med. Herald*, May, 1920, p. 105.

THERAPEUTICS.

- Janeway, H. H.** Therapeutic Use of Radium in Eye Disease. (Bibl.) *Arch. of Ophth.* v. 49, 1920, p. 174, and 238.

OPERATIONS.

- Landolt.** Improvement of Our Surgical Armamentarium. *Belgian Ophth. Soc.* Nov. 30, 1919. *Amer. Jour. Ophth.* v. 3, p. 363.
- Maynard, F. P.** Manual of Ophthalmic Operations. 2nd ed. 8 vo. Ill. with Stereoscopic plates. Calcutta: Thacker and Spink.

REFRACTION.

- Champlin, H. W.** Refraction Under Prolonged Fogging with a Minimum of Cycloplegics. *Jour. Ophth. Otol. and Laryngol.* May, 1920, p. 176-181.
- Goodall, E. B.** Speed of Accommodation. *Air Med. Service*, v. 1. 1920, p. 70-76.

- Harman, N. B.** Cycloplegia in Routine Refraction Work. *Brit. Med. Jour.* May, 1, 1920, p. 598-600.

- Howard, H. J.** New Apparatus for Testing Accommodation. (8 ill.) *Arch. of Ophth.* v. 49, 1920, p. 182-190.

- Sonder.** Influence of Diseases in Children on Progressive Myopia. *Arch. d'Opht.* v. 37, p. 290-298.

- Terson.** Refraction and Central Scotoma. *Soc. d'Opht. de Paris*, March, 1920. *Arch. d'Opht.* v. 37, p. 316.

- Whitwell, A.** Frame Power of a Lens. *Amer. Jour. Physiol. Optics*, April, 1920, p. 187-183.

OCULAR MOVEMENTS.

- Argañaraz, R.** Cerebral Nystagmus. (5 ill. Bibl.) *Arch. de Oftal. Hisp.-Amer.* v. 20, 1920, p. 105-136.

- Buchanan, J. N.** Two Methods of Applying Prism Test to Eyes. *Air Service Medical*, v. 1, 1920, p. 65-70.

- Cantonnet, A.** Ocular Ataxia in Tabes. *Presse Med.* v. 28, 1920, p. 156.

- Comby, J.** Headshaking with Nystagmus in Children. *Arch. de Méd. des Enfants* v. 23, 1920, p. 303. *Abst. Jour. A. M. A.*, v. 74, 1920, p. 1745.

- Crisp, W. H.** Bilateral Abducens Paralysis. (Dis.) *Amer. Jour. Ophth.* v. 3, 1920, p. 378.

- Crouzon and Behague.** Congenital and Familial Ophthalmoplegia. *Bull. de la Soc. Méd. des Hopitaux*, v. 44, 1920, p. 372. *Jour. A. M. A.*, v. 74, 1920, p. 1746.

- Dolman, P.** Maddox Multiple Red Rod. Consideration of Some of Its Optical Defects. *Arch. of Ophth.* v. 49, 1920, p. 194-197.

- Duane, A.** Routine in Examining Cases of Squint. *New York State Jour. Med.* v. 20, p. 181-187.

- Hoeye, J., van der.** Latent Nystagmus. *Arch. d'Opht.* Dec., 1917. *Abst. Brit. Jour. Ophth.*, v. 4, p. 289.

- Howard, H. J.** A Stereomicrometer. (6 ill.) *Amer. Jour. Ophth.*, v. 3, p. 417-421.

- Lafon, C.** Nystagmus. *Ann. d'Ocul.* v. 157, 1920, p. 209-236.

- Landolt.** Binocular Vision. *Soc. d'Opht. de Paris*, Feb., 1920. *Ann d'Ocul.*, v. 157, 1920, p. 245.

- McDavitt, T.** Homonymous Diplopia. *South-eastern Med. Jour.*, v. 13, p. 378-380.

- Maddox, E. E.** The Rod Screen Test. *Arch. of Ophth.*, v. 49, 1920, p. 229.
- Rutten.** Occupational Nystagmus of Miners. *Belgian Ophth. Soc.*, Nov., 1919. *Amer. Jour. Ophth.*, v. 3, 1920, p. 368.
- Sauvigneau, C.** Cerebral Origin of Strabismus. Treatment by Complementary Colored Glasses. *Jour. Ophth. Otol. and Laryngol.*, June, 1920, p. 236.
- Strickler, D. A.** Paralysis of Motor Oculi; Sudden Recovery. (Dis.) *Amer. Jour. Ophth.*, v. 3, 1920, p. 375.
- Suffa, G. A.** Synergism or Cooperative Action of Extraocular Muscles. (Dis.) *Jour. Ophth. Otol. and Laryngol.*, June, 1920, p. 206.
- Sykes, E. M.** Effect of Certain Intranasal Conditions Upon Extrinsic Muscles of Eye. *Texas State Jour. Med.*, v. 16, 1920, p. 10-12.
- Thomson, E. S.** Treatment of Muscular Anomalies. *New York State Jour. Med.*, v. 20, 1920, p. 178.
- Viterbi, A.** Traumatic Neuroses and Heterophoria. *Arch. di Ottal.*, v. 25. *Abst. Arch. d'Ophth.*, v. 37, p. 306.
- White, J. W.** Tenotomy of Inferior Oblique. *New York State Jour. Med.*, v. 20, 1920, p. 156.
- Turner, H. H.** Transplantation of Superior and Inferior Recti Fibres for Convergent Strabismus. (3 ill.) *Amer. Jour. Ophth.*, v. 3, 1920, p. 441.
- Merida, N.** Trachoma in Malaga; Geographic Distribution. (3 maps, Bibl.) *Arch. de Oft. Hisp.-Amer.*, v. 20, 1920, p. 62-96.
- Morton, H. Mcl.** Hyperplastic Subconjunctivitis. (2 ill. Bibl.) *Amer. Jour. Ophth.*, v. 3, 1920, p. 402-406.
- Myashita.** Secretions in Conjunctivitis. *Nippon Gank. Zasshi*, July, 1919.
- Ophthalmia Neonatorum.** *Brit. Jour. Ophth.*, v. 4, 1920, p. 288.
- Strader, G. L.** Rapid Cure of Gonorrheal Ophthalmia. *Amer. Jour. Ophth.*, v. 3, p. 454.
- Watanabe.** Radical Treatment of Trachoma. *Nippon Gank. Zasshi*, July, 1919.

CORNEA AND SCLERA.

- Bonnefon.** Scrofulous Keratitis of Vascular Type. *Jour. de Méd. de Bordeaux*, v. 91, p. 173. *Abst. Jour. A. M. A.*, v. 74, p. 1608.
- Fuchs, E.** Keratitis Profunda Provoked by Abnormal Composition of Aqueous Humor. (4 ill.) *Arch. de Oft. Hisp.-Amer.*, v. 20, 1920, p. 49-58.
- Fuwagawa, Y.** Megalocornea. *Nippon Gank. Zasshi*, July, 1919.
- Goldschneider and Bruckner.** Sensitiveness of Cornea. *Berl. klin. Woch.*, v. 56, 1919, p. 1225.
- Green, A. S., and Green, L. D.** Operation for Keratoconus with Report of Two Cases. (9 ill.) *Amer. Jour. Ophth.*, v. 3, 1920, p. 429-432.
- Harrington, R. R.** Coloboma of Sclera and Hernia of Choroid. (Dis.) *Amer. Jour. Ophth.*, v. 3, 1920, p. 372.
- Kleefeld.** Color of Corneal Ulcers with Gullstrand Lamp. *Belgian Ophth. Soc.*, April, 1920.
- Libby, G. F.** Kerato-iritis of Traumatic Origin. (Dis.) *Amer. Jour. Ophth.*, v. 3, 1920, p. 374.

ANTERIOR CHAMBER AND PUPIL.

- Cockroft, W. L.** Loewi's Epinephrin Mydriasis as Sign of Pancreatic Insufficiency. *Brit. Med. Jour.*, May 15, 1920, p. 669. *Abst. Jour. A. M. A.*, v. 74, p. 1743.
- Dunn, J.** Pupillary Symptoms in Embolus of Central Artery of Retina. *Arch. of Ophth.*, v. 49, 1920, p. 191-193.
- Lindberg, J. G.** Heterochromia of Iris. *Finska Läk. Handl. Helsingfors*, v. 62, 1920, p. 231.
- Shields, J. M.** Dust Like Persistent Pupillary Membrane. (Dis.) *Amer. Jour. Ophth.*, v. 3, 1920, p. 377.
- Strader, G. L.** Cyst in Anterior Chamber. *Amer. Jour. Ophth.*, v. 3, 1920, p. 448.

UVEAL TRACT.

- Bane, W. C.** Iridodonesis with Lens Opacities. *Amer. Jour. Ophth.*, v. 3, 1920, p. 453.
- Browning, S. H.** Radical Cure of Gonorrheal Iritis. *Roy. Soc. Med. Sec. on Ophth.*, Feb., 1920. *Amer. Jour. Ophth.*, v. 3, p. 438.
- Buxton, L. H.** Trachoma. *Southwest. Jour. Med. and Surg.*, v. 28, 1920, p. 56.
- Coutard and Offret.** Treatment of Follicular Conjunctivitis with X-Rays. *Ann. d'Ocul.*, v. 157, 1920, p. 240-244.
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CATARACT OPERATION ON GLAUCOMATOUS PATIENTS

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This discussion of cases in which cataract is developed after hypertension has been noticed, including two illustrative cases, was prepared as an address before the Section on Ophthalmology of the American Medical Association. But the absence of Dr. Morax from the meeting prevented its use on that occasion and its publication in the Transactions of the Section.

The coexistence of senile cataract and glaucoma, tho infrequent, gives rise to a series of problems, prognostics, operative indications and technic, which are among the gravest an oculist may have to solve.

We must establish categories of facts:

(a) In the first, of which we will not speak, opacification of the lens precedes hypertension. Acute or chronic glaucoma complicates the senile cataract.

(b) In the second category of facts, the study of which will form the subject of this communication, senile cataract develops in chronic, subacute or acute glaucomatous patients who have been affected for some time by hypertension, and in whom an iridectomy or sclerecto-iridectomy has allowed a satisfactory equilibrium of the ophthalmotonus to be maintained.

When we are in the presence of such a case, a certain number of questions crop up in our mind:

May we and must we operate?

At what time of the evolution of the cataract is it most suitable to operate?

In what manner shall we intervene for the extraction of the lens, and for the maintenance of the fistulous scar which prevents the loss of the retinal function?

What will be the functional result, and how long will the function last?

I do not think there are many of us who are able to base their conviction upon a great number of cases. But is

not that a reason to solicit the reporting of individual results, from which we shall perhaps be able to answer the preceding questions?

Bearing on a certain number of observations, of which I shall report the two most typical, and at the same time the longest followed, I will answer affirmatively the question: "May we and must we operate?"

There will, evidently, always be pusillanimous confrères who will not care to intervene in such delicate cases, but we think that the question ought to be viewed from a high point of view; provided that the operator is confident in his technic and rather high-minded, so as never to refuse the life-buoy to those whose sight is in danger of drowning.

In order to fix the moment of opportune intervention, I do not think it is necessary to proceed otherwise than in any case of opacification of the lens. For some time my only guide in the operative indication of the extraction of the lens was the state of visual function. In a patient in whom the acuity of one eye is sufficient, the extraction of the cataract on the other eye is never urgent.

If, on the contrary, both eyes are affected in a similar manner, it will not be necessary to wait for the complete maturity of the cataract in order to operate. This rule can be applied to glaucomatous eyes, as well as to patients whose ocular tension has always been normal. Up to the pres-

ent, my practice has not shown me that there was any interest in considering the question in another manner.

As to the two other questions concerning the best technic and the functional prognosis, I consider myself unable to answer otherwise than by relating two observations, of which one case gave a rather poor result, whereas the other may be considered as a decided success:

CASES.

CASE 1.—Mrs. P. lived in the constant fear of becoming blind; her mother died a blind woman with glaucoma and cataract. Her sister was also affected with glaucoma, and became blind in spite of an operation. Our patient's sight was always excellent till 1908, when she was sixty-one years old. She then had from time to time troubles in her left eye and saw coloured rings around the lights. The left eye was found to be slightly myopic, and this myopia increased in one year. On my first examination (in May, 1910) I found:

In the left eye myopia minus 5, with acuity one-half.

In the right eye emmetropia, acuity eight-tenths.

No modifications in the field of vision.

As the patient would not hear of an operation I could only prescribe the regular use of myotics. During two years I was able to control the vision and tension, and follow the increasing of the myopia of the lens in the left eye, without any change in the acuity. When the myotic was regularly used the tension of the eyes was normal, but one day, as the patient had ceased the use of this for eighteen hours, I found:

Right eye; forty-five millimetres of mercury.

Left eye—fifty millimetres of mercury.

I insisted upon the necessity of surgical intervention and I heard some time later than an iridectomy had been performed by a confrère.

During the year 1913, the patient came back to me because she had been told of a cataract on her left eye; she

incriminated her operator. It was not a traumatic cataract, but the natural evolution of the modification of her lens.

The tonometer gave the same indication in both eyes under pilocarpin: twenty-eight millimetres of mercury.

But from time to time new troubles appeared, when the patient discontinued her treatment, so I advised sclerecto-iridectomy for the right eye. The operation was performed with Elliott's technic and peripheral iridectomy. The result was very satisfactory and a good filtering scar was obtained. The tension oscillated between ten and thirteen millimetres of mercury.

One year later the tension was still the same, but the myopia of the lens had become more marked:

In July, 1916: Right eye—with minus 5, acuity equal to one-third. Visual field normal. Left eye—with minus 9, acuity one-fifth. Nasal contraction of the visual field.

On account of the visual trouble and the constant preoccupation of the patient, I advised the performing of cataract extraction of the left eye. The operation was done in January, 1918 without incident.

The result, which has not varied since, is a good one. The scleral section which was placed peripherally has left a small filtering scar, and the tension at present is twenty-four millimetres of mercury. The acuity reaches one-third with the correction of aphakia.

On the right eye the filtering scar is still active and the tension low. The increase of the opacity of the lens reduces the acuity to one-tenth.

COMMENT.—This observation is interesting from more than one standpoint: It allows one to follow the evolution of the modifications of the lens in both eyes. The beginning of myopia of the lens before any intervention, and its slow growth, show that there is no relation between these modifications and the operations.

The comparison of the patient's two eyes is also interesting: one eye being

operated by simple iridectomy and the other by sclerecto-iridectomy. In the left eye, in spite of the iridectomy and the inconstant use of pilocarpin, the tension was not sufficiently lowered, since the visual field has been reduced on the nasal side. In the eye operated by sclerecto-iridectomy the filtering scar has, for the last seven years, given a permanent result as regards tension.

We must now examine the extraction of the lens from the left eye: Let us notice that, in spite of the so-called nonmatured state of the cataract, the extraction was performed completely and without incident. The pupil is as transparent as possible.

As regards tension, the effect of extraction is good, and the result would have been excellent if the visual function had not been partially reduced by the hypertension.

CASE 2.—Mr. O. asked my advice in 1910. He is a strong fellow of about sixty who, from 1905, had experienced troubles in the right eye; but neglected them, and when I saw him had almost completely lost the use of it.

As the left eye was beginning to weaken he became anxious. I found in the right eye, excavation with atrophy of the disk; weak sensations of light excentrically. In the left, beginning of excavation and some peripheral opacity of the lens; acuity two-thirds, visual field normal.

I advised the regular use of pilocarpin, but the patient was very negligent in his treatment. Two years later I saw him again. The tension had reached thirty-five millimetres of mercury. The opacities of the lens had increased somewhat and troubled the vision when the pupil was contracted by pilocarpin. I therefore advised a sclerecto-iridectomy, but the patient refused to be operated, and for four years I saw nothing of him.

In January, 1916, he came back; the acuity of the left eye was one-half; the tension reached fifty millimetres of mercury, and the visual field was contracted on the nasal side. The tension remained the same after pilocarpin. This time the patient consented to be operated upon, and sclerecto-iridec-

tomy was performed in March,—sclerectomy with the Vacher forceps and wide iridectomy. The recovery was normal, but no filtering scar was obtained. Four months later the tension reached forty millimetres of mercury; acuity one-third.

I advised an anterior sclerotomy, which was performed in October, 1916, but the tension had not changed several days after, so that I performed a second sclerecto-iridectomy at the end of the month. The trephining was done with the one millimetre Bowman trephine. It was followed by a good filtering scar, and the tension was lowered to 12-15 millimetres of mercury for more than a year. But the cataractous process increased during this year, and in March, 1918, the patient requested the extraction of his lens.

I acceded, and in order to maintain the filtering scar I placed my sclerocorneal incision on the side between XI to IV o'clock. The extraction followed without incident and the patient was able to leave the clinic a week later. The anterior chamber was re-established on the second day, but we noticed that the filtering scar was no longer protruding. Nevertheless, the tension was good.

In May the tension rose in spite of the use of pilocarpin.

A third sclerecto-iridectomy was performed, with the same technic, at the end of May; and in the same sitting the posterior capsule was cut away.

After this last operation the patient could count fingers at one metre, but as the third sclerecto-iridectomy did not leave a filtering scar a new rise of tension occurred. Sight was lost in less than a year.

COMMENT.—The history of this patient shows us that we must not despair of obtaining a reduction of tension in a patient on whom a first sclerecto-iridectomy has not given the desired result. It was, in reality, after the third intervention that the filtering scar was obtained; thanks to which the vision was maintained, and it failed only by the progressive opacification of the lens.

The extraction of the lens presented neither difficulties nor postoperative incidents. But notwithstanding the care in placing the incision outside of the filtering scar, the latter obliterated itself during repair and in the absence of all infectious phenomena. The consequence was the return of hypertension.

Perhaps we should have been able to get a more durable result if the third

sclerecto-iridectomy had been as successful as the second one.

The improvements realized in the technic of sclerecto-iridectomy are very important, but no matter what the process is, we are never sure of obtaining a filtering scar. Of the three sclerecto-iridectomy operations performed on the patient, one only was followed by a scar assuring the equilibrium of the ocular tonus.

NATURE OF THE SOCALLED BLOOD INFILTRATION OF THE CORNEA

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This investigation made in the University Eye Clinic at Kioto under Prof. Ichikawa seems to throw light on the exact nature of the material causing the corneal discoloration and the process by which it arises. Translated from the German manuscript by Dr. J. D. Heitger.

That the cornea of an eye with a traumatic hemorrhage of the anterior chamber shows sometimes a peculiar reddish brown or yellowish green ring-like orbicular opacity has been known since the first communication of Schmidt-Rimpler (1875). The first author to give to this opacity the designation, "Blood Infiltration of the Cornea" was Hirschberg (1896).

Histologically this so-called blood infiltration of the cornea distinguishes itself thru a rich appearance of peculiar round to spindle shaped, highly refracting granules in the parenchyma of the cornea. These granules have been hitherto variously interpreted by different authors, for example by Baumgarten (1885) as types of organisms, by Leber (1884) as crystallized fibrin, by Vossius (1898) as hyalin degenerated corneal fibrils, by Nishimura (1915) as hemoglobin derived hyalin substance, by Treacher Collins (1896), Pincus (1896), Hotz (1900), O. Dodd (1901), and Buchanan (1912), as hematoïdin, by Kusama (1914) as melanosiderin, by Römer (1900) and Löhlein (1907) as an albuminous mass separated from hemoglobin.

In the following I desire to report some conditions which appear to be of

great importance in the explanation of these obscure granules.

Recently I have had the opportunity to study histologically two cases of traumatic opacity of the vitreous. In one of these, in which the vitreous by focal illumination was clinically dark green colored, I could point out in streak preparations of the vitreous, abundant fine round granules. In the second, which moreover still showed in the cornea the typical picture of so-called blood infiltration of the cornea, I could find abundant spindle shaped to round granules in the vitreous, as well as in the corneal parenchyma.

This remarkable condition in the first case, namely that in a case of traumatic vitreous hemorrhage peculiar granules are found in the vitreous, has not been mentioned before. Are they not identical with the granules found in the corneal parenchyma in the so-called blood infiltration of the cornea? This is the question which presented itself to me.

The second case, which, besides the vitreous hemorrhage with the aforementioned granule condition, showed in the cornea the typical picture of so-called blood infiltration of the cornea, gave me the best opportunity for answering this question.

CLINICAL HISTORIES AND HISTOLOGIC CONDITIONS

CASE 1. A twenty-one year old shoemaker. On March 8, 1916, his right eye was punctured with a needle. At that time a physician excised the prolapsed iris twice. On April 6th he noticed that his previously healthy left eye was weak. Received at the clinic April 7th. Present Condition: A well nourished man of great stature. Head,

papilla is markedly clouded and hyperemic; its edges have disappeared. The retina adjoining the papilla is also more or less clouded while the peripheral retina appears normal. The retinal vessels are full and tortuous. Nowhere hemorrhage or pigment proliferation nor white spots. The visual field of the left eye has a normal peripheral boundary, while in the middle there is a large ring scotoma. Vision:

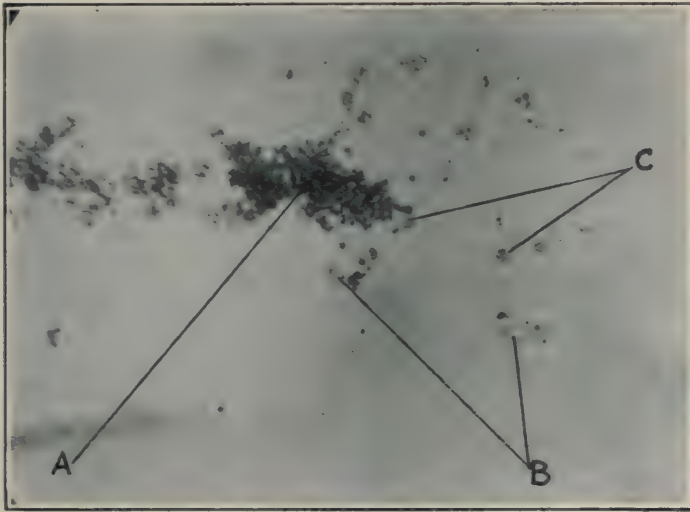


Fig. 1.—Smear from vitreous clouding in Case 2. A—Free granules in vitreous. B—Granules in the so-called blood cell shadows. C—Relatively well preserved erythrocytes.

nose and ears are normal. Thorax and abdomen intact. Urine negative. Wassermann reaction negative.

Condition of eyes: The right (injured) eye presents considerable ciliary injection. Near the temporal edge of the cornea one finds in the sclera a scar of brown color, about 2 mm. long and almost horizontal. The cornea is quite clear. No precipitates. No blood in the anterior chamber. No iris is visible. Lens clear. By oblique illumination one sees in the vitreous abundant dark green cloudy opacities, which move here and there irregularly with the movements of the eyes. The fundus is barely visible. Tension normal.

The left eye is outwardly normal. No precipitates. Iris and pupil are likewise normal. In the fundus the

R.—Fingers. (Projection good). L.—6/18.

Clinical Diagnosis: Conjunctival and scleral scar, artificial aniridia, vitreous opacity right eye. Suspicion of sympathetic neuroretinitis of left eye.

Course: April 11th (34 days after the injury and 24 days after the second operation (done somewhere else) the right eye was enucleated. After that the course was happy in that the left eye had normal vision on June 18th, and the neuroretinitic changes were much better.

Microscopic: The enucleated eyeball was fixed in Orth's mixture. After sufficient fixation, the eyeball was divided into two parts by an equatorial cut. From the vitreous, which showed not diffuse but sporadically cloudy brownish green opacities, several parts were taken and examined in teased preparations.

For staining there came for consideration hematoxylin eosin, ironhematoxylin (Heidenhain) Mallory's stain, etc.

Microscopically the opacities were made up of small round granules of different sizes; the largest itself being about $\frac{1}{4}$ the size of a red blood cell, the smallest about the size of a grain of dust. With eosin they stain rose red, with Mallory's stain sudan red, and with iron hematoxylin, deep blue.

The lower half is somewhat clouded, not gray but more brownish green and less marked than above.

This green opacity is seated in the deeper layers of the cornea, is orbicular in shape and is divided from the limbus by a relatively clear zone about 1 mm. wide. Iris and pupil as well as they can be seen thru the corneal opacity are totally covered by a blood mass. The bulb is tolerably tender to touch. Intra-

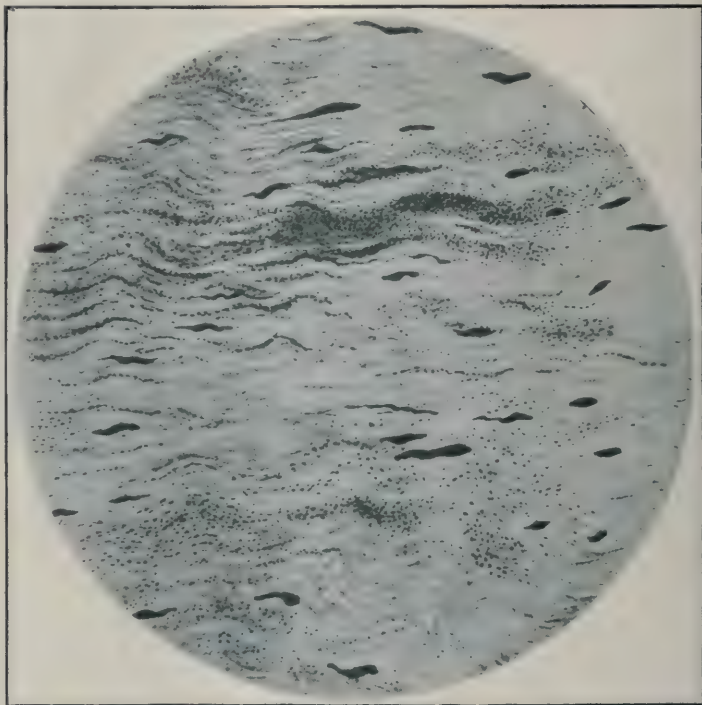


Fig. 2.—Section of cornea from Case 2. Granules in the corneal parenchyma.

CASE 2. A 41 year old farmer. On January 18, 1916, his right eye was injured by a blow from a wooden plate. On account of pain and disturbed vision he sought the eye clinic on February 22nd.

Present Condition: A powerfully built man. Thorax and abdomen negative. Urine normal. Eye condition: Except for the slight opacity of the cornea the left eye appears normal. V=6/6. The right eye presents ciliary injection. The upper corneal half is tolerably grayish white, and above thru vascularization clearly red clouded.

ocular pressure* reduced. Vision only light perception. Projection poor.

Clinical Diagnosis: Macula cornea of the left eye. Traumatic iridocyclitis. Hyphema and blood infiltration of the cornea of the right eye.

Course: On February 22 (35 days after injury) the right eye was exenterated, and on May 13th he was discharged.

Microscopic Examination: The whole exenterated mass (cornea, uvea and vitreous) was, after fixation in 10 per cent formalin, washing, etc., imbedded in celloidin and cut in series. Only a

part of the vitreous was examined in teased preparations.

The vitreous in this case was entirely like that in the first, in that abundant granules were found. The different condition which especially surprised us was the contemporary existence of abundant so-called blood cell shadows. The last were mostly swollen, sometimes round, sometimes oval or pear-shaped, and appeared very pale from loss of hemoglobin. The remarkable condition which was met with in these blood cell shadows, was the occurrence of fine granules in them, which were not different in their tinctorial behavior or form from these free granules in the vitreous. The last condition shows most clearly that the granules lying free in the vitreous originate from the changed erythrocytes, blood cell shadows.

The most important condition, which surprised us in the cut preparation and which must be especially mentioned, is the contemporary occurrence of the peculiar granules in the cornea as characteristically demonstrated in the so-called blood infiltration of the cornea. One finds in the lower part of the cornea, where clinically a greenish brown orbicular opacity was observed, by greater magnification, abundant granules which stain rose red with eosin, violet red with Mallory's stain and deep blue with Heidenhain's iron hematoxylin. Their size is various from barely visible dust to about half the size of Koch-Weeks' bacilli. The larger types are rod shaped and

mostly pointed on both ends. They lay for the greater part with their long axis parallel to the corneal lamellae. Otherwise in this part of the cornea there are no pathologic changes to be found; here one finds no hemorrhage, no new formation of blood vessels and no inflammatory cell infiltration. Descemet's membrane and the endothelium are likewise without change.

TINCTORIAL BEHAVIOR OF GRANULES TO DIFFERENT STAINS

It is of the greatest interest to determine whether or not the free granules in the vitreous of the aforementioned cases behave the same tinctorially as the granules in the cornea, of the two cases which showed clinically the typical picture of the so-called blood infiltration of the cornea. I have placed the results of my investigation relative to this in table 1.

It is to be seen from this table that there is no doubt that the granules found in both of my cases in the vitreous, as well as in the cornea, behave tinctorially wholly the same.

Microchemical behavior of the granules in both cases. The following table shows the results of my investigation relative to this.

This result also shows the granules free in the vitreous behave the same chemically, as the granules in the cornea in so-called blood infiltration of the cornea.

After I have made clear thru the

TABLE I.

Preparation	Stain.	Case I.	Case II.	
			Cut preparation.	
		Granules in Vitreous.	Granules in Vitreous.	Granules in corneal parenchyma.
Hematoxylin (Römer)	Eosin	rose red	rose red	rose red
Van Gieson		orange	orange	not clear
Picro acid		yellow	yellow	not clear
Mallory's stain		sudan red	violet red	violet red
Iron Hematoxylin (Heidenhain)		deep blue	deep blue	deep blue
Giemsa's stain		rose red	blue	blue
Fibrin stain (Weigert)			violet	not clear
Picrocarmin			light yellow	not clear
Lithiocarmin		not stained	not stained	not stained
Muzicarmin		not stained	not stained	not stained
Sudan III		not stained		
Amyloid stain (Methyl violet)		not stained	not stained	not stained
Amyloid stain (Iodin)		not stained	not stained	not stained
Cholesterin stain (Lugol)		not stained	not stained	not stained
Russel's hyalin stain			not clear	not clear
Unna Pappenheim's stain			not clear	not clear
Methylen blue (Loeffler)			blue	blue
Bismarck brown			yellowish brown	not clear
Pure cresyl violet			violet	not clear

existing analyses that the peculiar granules first found by me in the vitreous in both cases of traumatic vitreous hemorrhage originate from the changed red blood cells, blood shadows; and that they behave tinctorially and chemically the same as the granules in the cornea with the typical picture of so-called blood infiltration of the cornea, I am in a position to advance my own views of the so-called blood infiltration of the cornea and to criticise the prevailing views of the different authors on this question.

One asks if the previously widely accepted opinion is well grounded; namely, that the granules in the cornea in so-called blood infiltration of the cornea originate from the coloring matter released in the aqueous humor, and arise first thru the transformation of the latter from a soluble to an insoluble condition. This opinion appears reasonable insofar as the thus produced opacity of the cornea is colored a peculiar green. To this another explanation is admissible, which I will show later, that the existence of the granules in the cornea and the staining of the cornea can be proven to be due to two entirely different things.

The literature brings nothing for the sure proof that they develop from the hemoglobin. Kusama has explained them as melanosiderin of hematogenous

origin, on the ground that the granules dissolved in concentrated hydrochloric acid and other strong depigmenting agents. Against this assumption is the temporary relation that the so-called blood infiltration of the cornea appeared about two weeks after the injury. In the case observed by Pincus it appeared three days after the injury. According to Golodetz and Unna it requires as a rule 6 to 7 weeks for the production of hemosiderin from hemoglobin and for the production of melanosiderin from hemosiderin a still longer time. Since the granules are entirely uninfluenced by sulphuric acid it is difficult to reconcile this assumption as melanosiderin is soluble in this acid. The color of these granules is not in favor of this assumption as they show no dark brown color. I am inclined to believe that the assumption of the hemaglobin nature of these granules requires further proof.

My results are that:

(1) Abundant fine round granules appear in the vitreous in cases of traumatic hemorrhage into the vitreous.

(2) That the granules in question originate from changed red blood cells, the so-called blood cell shadows.

(3) Finally that these granules in the vitreous and the characteristically demonstrated granules in the cornea, in the

TABLE II.

Reagent.	Time period.	Case I.		Case II.	
		Granules in Vitreous.	Granules in Vitreous.	Cut preparation.	
				Granules in Vitreous.	Granules in corneal parenchyma.
10° hydrochloric acid.....	24 hrs.	insol.	insol.	insol.	insol.
10° sulphuric acid.....	24 hrs.	insol.	insol.	insol.	insol.
10° nitric acid.....	24 hrs.	insol.	insol.	insol.	insol.
Acetic acid.....	72 hrs.	insol.	insol.	insol.	insol.
Pure HCl, sp. g. 1.9.....	10 min.	insol.	insol.	insol.	insol.
Pure nitric acid.....	10 min.	insol.	insol.	insol.	insol.
Pure sulphuric acid sp. g. 1.84.....	10 min.	insol.	insol.	soluble	soluble
Pure hydrochloric acid, sp. g. 1.9...	24 hrs.	soluble	soluble	soluble	soluble
1° caustic potash.....	24 hrs.	soluble	soluble	soluble	soluble
0.1° caustic potash.....	10 min.	insol.	insol.	insol.	insol.
Ammonia.....	24 hrs.	insol.	insol.	insol.	insol.
Acid-alcohol.....	24 hrs.	insol.	insol.	insol.	insol.
Alcohol.....	24 hrs.	insol.	insol.	insol.	insol.
Ether.....	24 hrs.	insol.	insol.	insol.	insol.
Chloroform.....	72 hrs.	insol.	insol.	insol.	insol.
Water.....	Several days	insol.	insol.	insol.	insol.
H ₂ O ₂	7 days	partly soluble	partly soluble	partly soluble	partly soluble
Pot. permanganat and oxalic acid.....	7 days and 30 min.	soluble	soluble	soluble	soluble
0.5° Trypsin.....	24 hrs.	solution	insol.	insol.	insol.
Iron reaction (Berlin blue).....	....	negative	negative	negative	negative
Iron reaction (Ammonium sulphid).....	....	negative	negative	negative	negative
Haemin crystal formation.....	....	....	negative	....	....

socalled blood infiltration of the cornea behave exactly the same tinctorially and chemically.

These observations force us to the conclusion that the granules in the cornea, in the socalled blood infiltration, arise from the erythrocytes themselves; and are not formed in loco but rather in some other segment of the eye and from there as such conveyed to the cornea. By this it is naturally not meant that the granules in the cornea pass directly from the vitreous to the cornea. Even if I did not find in both my cases the same granules in the anterior chamber as they were found in the vitreous, it is very reasonable that they occurred there at one time; as in the socalled blood infiltration of the cornea hyphema of the anterior chamber is a never failing condition.

It is very remarkable that the contents of the anterior chamber in socalled blood infiltration of the cornea have previously very rarely been the object of investigation. I find in the literature on this only the communications of Engel and Kagoshima. Both these authors have in their investigations directed their chief aim to the blood coloring matter, without giving sufficient attention to the morphologic changes of the contents. However, Engel mentions the occurrence of fine granules and blood shadows in the anterior chamber, without attributing any special importance to them. I consequently believe, at first in the socalled blood infiltrations of the cornea, peculiar granules develop from the blood cell shadows in the anterior chamber and these as such are further displaced into the cornea to produce the complete picture of the socalled blood infiltration of the cornea. The eventual infiltration of the cornea. The eventual difference in the outer form which I found in my two cases, between the fine granules in the vitreous and the granules in the cornea. I may consider as an unsubstantial one; as the granules in the cornea were of many shapes and manytimes in the literature described not as spindle shaped as in my two cases, but more as round in shape.

The questions, as to how much and under what conditions such granules develop from erythrocytes and how they

are transported from the anterior chamber to the cornea are difficult to answer, and will be retained for further investigations. The rare occurrence of the socalled blood infiltration of the cornea, as compared to traumatic hemorrhage in the anterior chamber, permits us to conjecture that the physiologic path of the aqueous diffusion hardly comes into consideration as Roemer and Treacher Collins assume.

Finally I would like to present a question, whether one is justified to view all hitherto reported cases in regarding blood infiltration as a uniform change. When one reviews the literature pertaining to this he will be immediately surprised that the color of the corneal opacity is so differently described. It is mentioned for example as almost red brown (Vossius, Treacher Collins, Pincus, v. Barley, Meissner), almost greenish brown, (Vossius, Hirschberg, Richter, Laas, Kusama), almost yellowish green, (O. Scheffels, Kayser, v. Barley, Buchanan). The microscopic condition is by no means the same because one series of authors (Vossius, Michel) found only granules with a positive iron reaction, whereas the others found only the same with a negative iron reaction, (Baumgarten, Vossius, Nishimura), or both kinds of granules were mixed there in (Vossius, Treacher Collins, Römer, Löhlein, Kusama.)

All this makes it reasonable that the socalled blood infiltration of the cornea presents neither a clinical nor a histologic uniform change. On account of this the following briefly reported case lays claim to special interest as it, in spite of the beautiful greenish yellow color of the cornea, presented histologically no positive granule condition, and as such stands alone.

CASE OF GREENISH YELLOW STAINING OF CORNEA.

The case concerned a 16 year old boy, who in 1911 had both eyes operated for high grade myopia, complicated by cataract. At the end of Nov. 1915 weakness of the right eye occurred, which gradually increased, and in Feb. 1916 caused him headache and vomiting associated with redness. Since this time a yellowish

green color of the cornea of this eye has become noticeable. On May 22nd he was received at the clinic. At that time the following history was obtained:

The pronounced signs of congenital lues. Nervous system free. Urine negative. Both eyes are large and somewhat exophthalmic. The right eye is irritated and pericorneally injected. The cornea of this eye is of normal size, shape and curvature, is provided with many deep lying vessels and is distinctly yellowish in color. This opacity is orbicular and darker in the middle. The anterior chamber is of normal depth, clear and contains no hyphema. Iris atrophic. The pupil is almost maximally dilated, free from synechiae and totally rigid. Vision light perception. (Uncertain projection) T. —. The left eye is free from irritation. Cornea, anterior chamber and iris are without change. In the pupillary region secondary cataract membrane. The fundus shows nothing particularly in myopic changes. Vision, fingers at 3 feet and with —3. V=6/24. Tension normal.

The right eye was enucleated and fixed in 10 percent formalin.

The histologic examination of the cornea of this eye was, contrary to my expectation, entirely negative: instead of a typical clinical picture of corneal blood infiltration there were no granules to be found. In the gelatinous, greenish yellow mass, which completely filled the vitreous cavity one could point out neither blood cell shadows nor granules. Dr. M. Tomita, the assistant of the medico-chemical institute, was able at my request to extract from this vitreous mass an alcohol soluble substance, which gave a beautiful Gmelin's reaction.

This case shows clearly that the clinical picture of so-called blood infiltration of the cornea can arise without the appearance of granules in the cornea. There is here a single assumption admissible, that the coloring of the cornea is caused by the coloring matter of the blood which is forced into the cornea along the path of diffusion. This case shows most clearly, contrary to the previously ruling opinion, that the existence of granules in the cornea and the peculiar staining of the cornea in the so-called

blood infiltration in the cornea and the peculiar staining of the cornea in so-called corneal blood infiltration can sometimes imply two utterly different conditions.

CONCLUSION.

(1) In one case of old traumatic hemorrhage of the vitreous, which appeared dark green by oblique illumination, abundant small granules were found histologically in the vitreous.

(2) In another case of traumatic hemorrhage of the vitreous and anterior chamber, with typical blood infiltration of the cornea, the same granules were found in the vitreous as in the first case and in the parenchyma of the cornea, the same granules previously variously described as characteristic for the so-called corneal blood infiltration.

(3) The two types of granules behave the same toward different stains and chemical reagents.

(4) The two types of granules should therefore be probably identical.

(5) If this assumption is correct, it is probable, that the granules in the parenchyma of the cornea in so-called corneal blood infiltration are not formed in loco, but produced in some other place and as such carried to the cornea.

(6) The granules found in the vitreous are not alone abundantly free but also often contained in the blood cell shadows. This proves that the granules probably arise from the blood cell shadows.

(7) From aforementioned 5 and 6 it follows that the previously prevailing view that the granules in the corneal parenchyma, in so-called blood infiltration of the cornea, develop by the conversion of the free blood coloring matter in the anterior chamber to a combined state, is untenable. The remaining assumptions which search for the site of the development of the granules in the cornea itself are, according to my opinion, just as little plausible.

(8) By which path the granules, formed from red blood cells in the vitreous and in the anterior chamber enter the cornea is not clear.

(9) For the completion of the picture

of so-called blood infiltration of the cornea the existence of the granules previously described as characteristic in the cornea is not necessary. There is a type of case in which the staining of the cornea is caused exclusively by freed blood coloring matter. The typical staining of

the cornea and the existence of granules can therefore possibly have to do with two utterly different things.

In conclusion I express my heartfelt thanks to Prof. K. Ichikawa for the possession of the material and for the kindly suggestion for this work.

EARLY DIAGNOSIS OF PITUITARY TUMOR WITH OCULAR PHENOMENA.

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ROCHESTER, MINN.

This paper from the Section on Ophthalmology of the Mayo Clinic is based on the analysis of cases seen there. Altho the final diagnosis may rest on other grounds, the ocular findings should awake suspicion and direct attention to their real cause. They may also determine the question of operative treatment. Presented before the Section on Ophthalmology of the A. M. A. April 29, 1920, and published here by courtesy of the Journal of the A. M. A.

The marked advance in surgical therapy of pituitary disorders made during the last few years has been due in large part to the greater certainty with which tumors of the hypophysis have been diagnosed, and to the fact that such a diagnosis could be made early in the course of the disease. The physiologic phenomena as well as the gross structural changes and irregular organic development due to secretory derangements do not demand the radical treatment that failing vision does; and altho pituitary disorders in such conditions are frankly present, they have little interest for the surgeon.

The experience of a few years has been sufficient to define the field of surgical therapy in pituitary disorders and to demonstrate the value of operative procedures in pituitary tumors that result in ocular phenomena from involvement of the chiasm and the optic tracts. Tumors of the hypophysis can be reached and often removed under conditions that allow close inspection of the sella and surrounding structures, so that much of the uncertainty which accompanied decompression has been dispelled. With the greater likelihood of complete removal of the tumor and a better prognosis, there will be less hesitancy on the part of the surgeon to undertake the operation,

and a greater willingness on the part of the patient to undergo the risks involved.

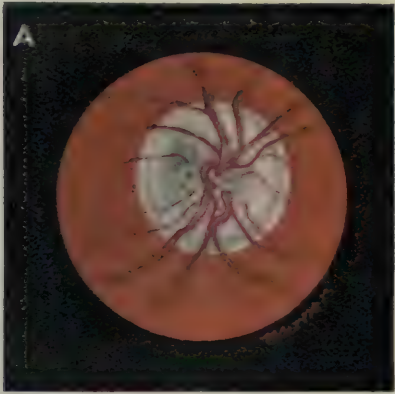
Ocular changes constitute the chief symptom in a large number of pituitary tumors, and are often our only means of identifying the condition (Table 1). The ocular phenomena associated with pituitary tumor consist in contracted fields, lowered visual acuity, and changes in the ophthalmoscopic picture of the nerve heads that have been referred to as optic atrophy, and which are the results of pressure on the optic tracts in the region of the chiasm.

The rapid advancement of surgical therapy in pituitary tumor makes desirable early diagnosis, and the diagnosis can often be made before constitutional symptoms of the disease are developed. A great number of such cases will first be seen and should be recognized by the ophthalmologist. The increasing number of pituitary tumors reported seems to indicate that more attention is being directed toward recognition of this condition; but I am convinced that more detailed examination of patients who complain of headache, lowered visual acuity that cannot satisfactorily be improved by glasses, drowsiness, and inability to concentrate on mental work will lead to early rec-

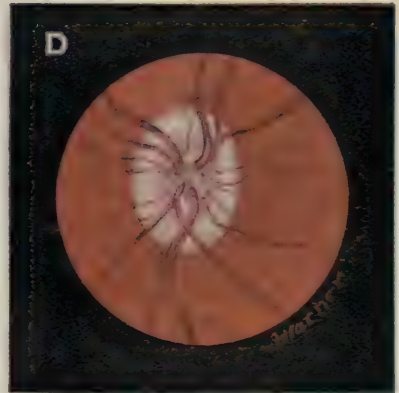
TABLE 1—OCULAR PHENOMENA IN THIRTY-TWO SELECTED CASES OF PITUITARY TUMOR.

Case	Age	Sex*	Constitutional Evidences of Pituitary Disease	Condition of Sella Roentgenogram	Fields	Condition of Dises
207279	42	♂	None	Normal	Bitemporal hemianopsia	Pallor
270734	48	♀	Central nervous system negative	Normal	R. Temporal contraction	Pallor
250408	41	♀	None	Normal	Bitemporal hemianopsia	Normal
254897	38	♂	None	Normal	Bitemporal hemianopsia	Normal
207683	28	♀	None	Normal	R. Temporal contraction	Pallor
295780	49	♀	Metabolic rate -23, suggestive of myxedema.....	Normal	L. Temporal contraction	Pallor
265097	28	♂	None; sellar decompression 15 months before.....	Enlarged	Bitemporal hemianopsia	Atrophy
201188	50	♀	None	Enlarged	Bitemporal hemianopsia	Pallor
234782	38	♀	Headaches; central nervous system negative	Enlarged	Bitemporal hemianopsia	Normal
239742	26	♂	None	Enlarged	R. Homonymous hemianopsia	Pallor
253290	28	♂	Metabolic rate +19; acromegaly 8 years.....	Enlarged	Bitemporal hemianopsia	Pallor
210605	38	♀	Acromegaly 5 years.....	Enlarged	Temporal contraction	Normal
219123	9	♀	None	Partial destruction	R. homonymous hemianopsia	R. hyperemia choked disc, L.
201329	60	♂	None	Partial destruction	R. Temporal hemianopsia	Pallor
204823	49	♂	None	Partial destruction	L. Contraction hemonymous hemianopsia	Pallor
205813	53	♂	None	"	R. Temporal hemianopsia	Atrophy
45560	36	♀	Cessation of menstruation 12 years ago.....	"	L. Temporal hemianopsia	Atrophy R. pallor L.
236675	29	♀	Cessation of menstruation 4 years ago.....	"	Bitemporal hemianopsia	Normal
271683	33	♀	Decompression for pituitary 5 years.....	"	Bitemporal hemianopsia	Pallor
25558	52	♀	Gain in weight; drowsiness for 2 years.....	"	Bitemporal hemianopsia	Pallor
257278	54	♀	None; central nervous system negative	Partial destruction	Bitemporal hemianopsia	Pallor
248126	29	♂	Metabolic rate -10; cent. nervous system neg.....	Partial destruction	Bitemporal hemianopsia	Pallor
268798	42	♀	General exam.; cent. nervous system neg.....	Partial destruction	Bitemporal hemianopsia	Pallor
293423	31	♀	History inconclusive.....	Partial destruction	Bitemporal hemianopsia	Pallor
288874	32	♂	Metabolic rate -8.....	Partial destruction	Bitemporal hemianopsia	Pallor
216363	33	♂	None	Complete destruction	L. Temporal hemianopsia	Atrophy R., hyperemia left eye
253633	43	♂	None	Complete destruction	Bitemporal hemianopsia	Pallor
262796	51	♂	None	Complete destruction	Contraction (both), L. Temporal hemianopsia	Atrophy
245366	36	♂	Acromegaly	Complete destruction	Small triangle in fourth Quadrant R.	Pallor
251151	42	♀	None	Complete destruction	R. Temporal hemianopsia	Atrophy
274037	60	♀	None; central nervous system negative	Complete destruction	R. Temporal contraction	Pallor
35174	50	♀	Metabolic rate -19; cent. nervous system neg.....	Complete destruction	Bitemporal hemianopsia	Pallor
General and central nervous system examinations negative.....						23
Acromegaly						3
Menstrual disturbance, marked hypopituitarism, previous operation.....						6

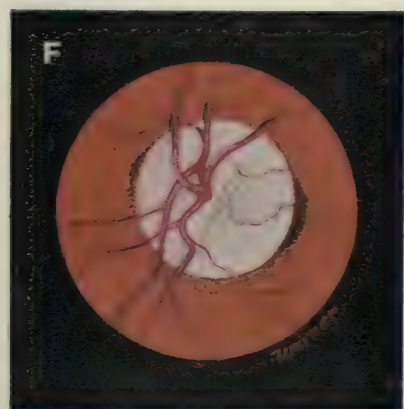
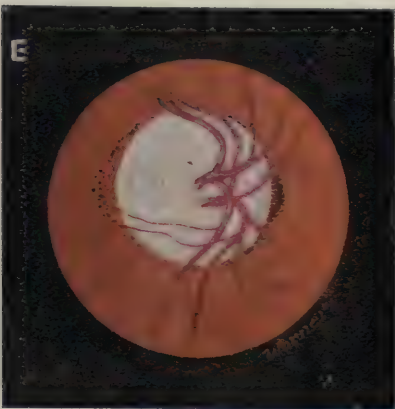
*In this column, male is designated by ♂ and female by ♀.



PALLOR OF DISC WITHOUT ATROPHY IN A CASE OF PITUITARY TUMOR. A. (RIGHT). B. (LEFT).



PALLOR OF DISC WITHOUT ATROPHY IN A CASE OF PITUITARY TUMOR C. (RIGHT). D. (LEFT).



PRIMARY OPTIC ATROPHY. E. (RIGHT). F. (LEFT).

ognition of the cases which now frequently remain unrecognized until constitutional evidences of pituitary disease become manifest. The frequent absence of constitutional disorders, and the negative findings on examination of the central nervous system except for ocular disorders, place the case squarely in the hands of the ophthalmologist. The slow loss of visual acuity, the gradual and progressive narrowing of the visual field, as described by Josephson,¹ in a manner that is largely characteristic of the disease, and the appearance of the nerve head in the fundus constitute the only measurable factors that are concerned in the progress of the lesion, and furnish the basis for diagnosis, treatment, and prognosis.

VISUAL ACUITY.

I shall not attempt to review the literature here nor to compare results of examination with those of other investigators but shall point out the important items gained from a study of thirty-two cases examined at the Mayo Clinic. Lowered visual acuity of one or both eyes was a symptom in every case examined; lowered acuity in one eye with 6/6 or better in the other eye was noted in five. The onset of visual disturbance was usually gradual. In Case 207279 there is good reason to believe that the vision began to fail in the right eye because of pituitary tumor nineteen years before examination in the clinic, and in the left eye four years before. One patient (Case 253290) stated that the vision of the left eye failed suddenly after two years of acromegaly. Six years later he still retained ability to count fingers with that eye. Six patients had no light perception in one eye, but retained some vision in the other eye.

Near vision as well as distance vision is usually affected, and only rarely will glasses improve it. In the cases of this series there was little change in visual acuity from day to day or month to month, except a steady failure in the progressive cases. Rapid changes were sometimes found, particularly in the visual fields, and it was often necessary

to average a series of successive charts to appreciate the general trend of contraction.

FIELDS OF VISION.

The character of the field is determined by the size and position of the tumor. The field will vary with the growth of the mass and with variations in pressure at the chiasm. Probably the most characteristic field is that showing bitemporal hemianopsia, or homonymous hemianopsia, altho frequently only one quadrant is greatly affected. The progressive limitation of peripheral vision has been adequately described by Cushing and Walker.² The cases fall naturally into three groups: (1) those with bitemporal hemianopsia; (2) those with homonymous hemianopsia, and (3) those with no light perception in one eye and with temporal defect in the other eye. In the first class were twenty cases, in the second two, and in the third, ten. There were no cases with nasal hemianopsia in one eye and blindness in the other. Several of the ten patients in the third group stated that their vision had failed in the temporal side first; others did not know the manner in which the field was lost.

The change in the character of the field as well as the visual acuity may be altered by conditions that materially change the pressure in the region of the chiasm. A decompression at the side of the head or at the sella will give temporary increase of visual acuity as well as increase of the size of the field. Veasey³ reported temporary increase of vision in a blind temporal field after the administration of amyl nitrit. In Case 250408 of this series there was temporary increase of vision after an operation for suppurative sinusitis.

CASE 250408.—Mrs. P., aged 41, came for examination, Nov. 8, 1918, complaining of progressive failing vision which had begun three weeks previously. The eye history up to that time had been negative. The failure in vision was not accompanied by pain or headache. The general history was negative except that the patient had passed through the menopause at the

age of 36. Examination revealed the eyes to be normal in position, the lids, conjunctivae and corneas clear; the pupils, which were equal and round, reacted normally to direct and consensual light stimulation and in accommodation. Ophthalmoscopic examination

grees on the horizontal meridian. A roentgenogram of the head revealed a normal sella turcica, but a large calcified pineal body. There were many bad roots in the jaw. The tonsils were moderately enlarged and contained fluid pus; the nasal septum was devi-

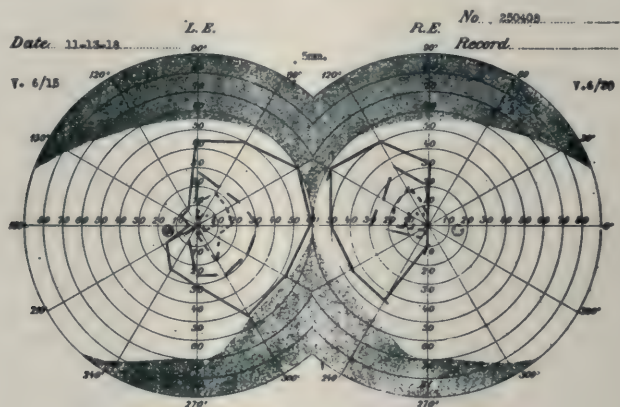


Fig. 1.—(Case 250408). Visual fields, Nov. 13, 1918.

revealed the media to be clear, the disks slightly oval, long axes vertical, margins well defined, and the nerve heads pale pink without swelling or shrinkage of the nerve substance. There was no change in the retinal circulation or other lesion of the fundus. Vision in the right eye was 6/30; in the left, 6/15. The fields showed bi-temporal hemianopsia. The field in the right eye was cut squarely thru the macular region, and in the left eye the temporal field encroached within 5 de-

ated to the right, causing almost complete obstruction. There were polyps in both middle meatuses, and there was much pus in the left nostril.

Nov. 15, 1918, a submucous resection of the nasal septum was done (Lillie) and the nasal polyps were removed. The ethmoids were not exenterated. November 18; the patient volunteered the information that she could see much more to the side than previously, and that her vision was much clearer. Examination on that day revealed vis-

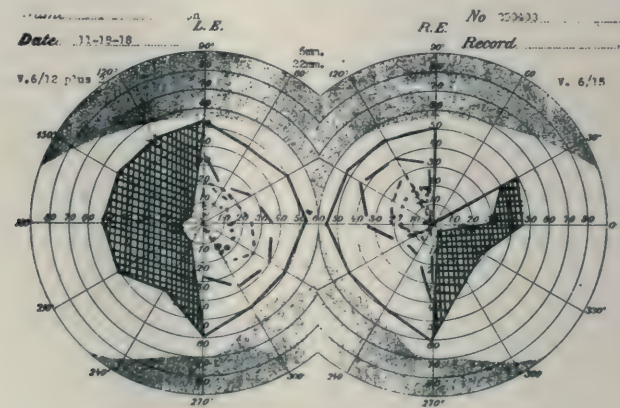


Fig. 2.—(Case 250408). Visual fields, Nov. 18, 1918.

ual acuity of the right eye to be 6/15, of the left 6/12 plus 2. The field of the right eye was increased to between 30 and 50 degrees in the lower outer quadrant, and the field in the left eye was increased uniformly to 50 degrees. This increase in the fields was merely a rela-

see to read. The fields taken on that day, however, showed no improvement; in fact, some of the relative fields in both eyes had been lost between the last two operations. No further sinus operations were necessary. The vision had now improved to 6/12 in the right

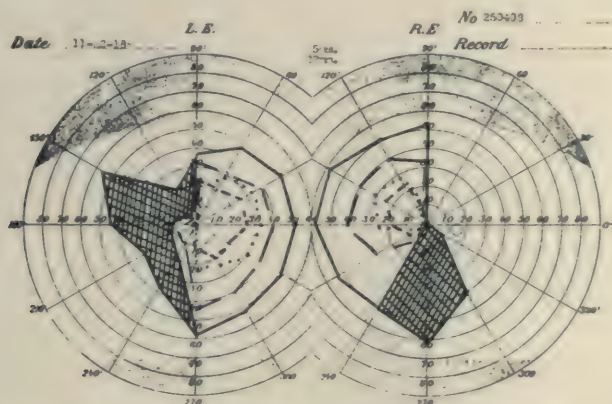


Fig. 3.—(Case 250408). Visual fields, Nov. 22, 1918.

tive increase, showing with a 22 mm. test object at 290 mm., but not found when the 5 mm. test object was used. November 23, the patient had a pan sinus exenteration (right side). "The middle meatus and ethmoid labyrinth were filled with pus and hyperplastic tissue. The ethmoid labyrinth gave the sensation of brittleness and was entirely exenterated. The sphenoid was entered and found to be not affected. The antrum was irrigated and foul pus removed" (Lillie). November 27, the patient stated that she could

eye and 6/10 in the left. December 18, the relative field with 22 mm. test object at 290 mm. was narrow, and the patient had almost complete bitemporal hemianopsia with 6/12 vision in the right eye and 6/7 in the left. Feb. 19, 1919, she had complete bitemporal hemianopsia, with the fields divided vertically just to the temporal side of the point of fixation.

The improvement in vision and in fields in this case was only temporary, and altho the visual acuity remained good, the fields resumed the form char-

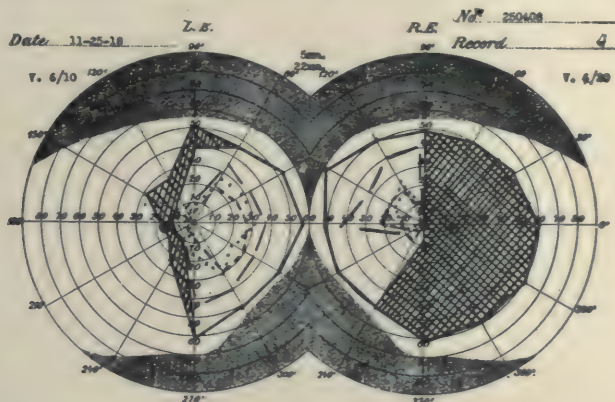


Fig. 4.—(Case 250408). Visual fields, Nov. 25, 1918.

acteristic of pituitary tumor. The greatest improvement was noticed immediately after any operation or manipulation about the nose which would temporarily increase the circulation to the nasopharynx (Charts 1-10).

So much depends on the form of the

APPEARANCES OF NERVE HEAD.

(See Plate VII, p. 572.)

One of the most important ocular changes brought on by pituitary tumor is the appearance of the nerve head as seen with the ophthalmoscope. A pe-

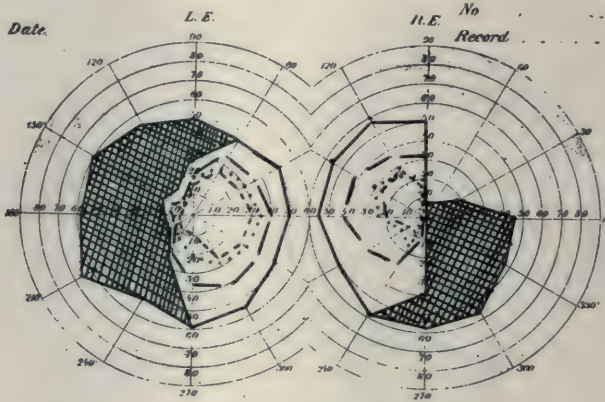


Fig. 5.—(Case 250408). Visual fields, Nov. 29, 1918.

field found that the importance of careful field taking cannot be over-emphasized. We have not found it possible to resort to the intensive painstaking methods of Walker,⁴ nor do I believe it necessary. Field examinations that require more than half an hour are likely to be unreliable because the patient tires of the process and answers incorrectly. Examinations were made on succeeding days under varying lighting conditions, time of day, and weariness of the patient.

cular waxy pallor of the nerve without shrinkage is seen so often that it has become practically a diagnostic feature. The pallor is not due to atrophy of the optic nerve, unless vision has been destroyed almost entirely for a considerable length of time, and it is accompanied by an atrophic excavation of the disc, such as is seen in atrophy of tabes and toxic neuritis. In the atrophy of tabes, the pallor of the disc, the loss of vision and the shrinkage of the nerve itself progress together; if

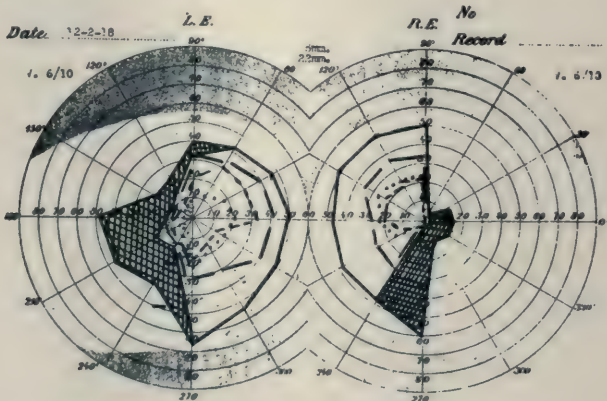


Fig. 6.—(Case 250408). Visual fields, Dec. 2, 1918.

any difference is found, the vision often seems too good for the extent of pallor and excavation of the disc seen with the ophthalmoscope. In toxic neuritis, the vision fails first; the shrinkage of the nerve and the pallor of the disc follow together. In the case of pres-

stance itself is pale, but otherwise not noticeably changed. The pallor of the nerve head without loss of substances is the characteristic ophthalmoscopic feature of chiasmal pressure, and serves as a basis for estimating the probability of recovery of vision. The nerve head

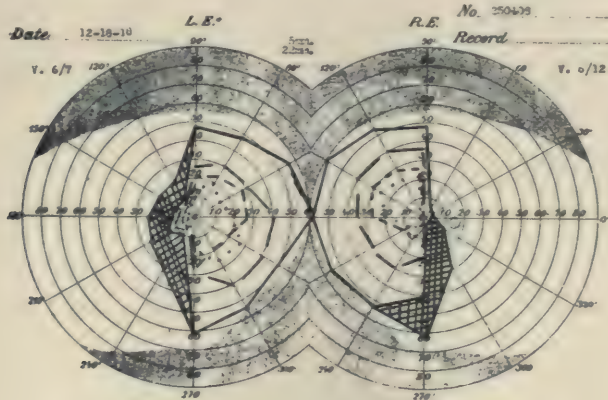


Fig. 7.—(Case 250408). Visual fields, Dec. 18, 1918.

sure at the chiasm from pituitary or other tumor, the appearance of pallor of the disc may not be noticeable for years after the onset of the loss of vision. The pallor is not accompanied by shrinkage of the nerve substance or atrophic excavation. Visual acuity may be 6/6 or better in an eye with a blind temporal field. The disc may be quite pale, but there is no appearance of swelling or shrinkage of the nerve head. The disc margins are well defined. The physiologic cup is not altered in size or shape. The nerve sub-

usually is a waxy yellow, with no elevation, and no changes in relation to disc margins or lamina cribrosa. The great vessels are not altered. Only the small vessels that give the nerve head its usual pink color are obliterated. The pallor is usually evenly distributed over the disc, that is, there is no disproportionate pallor of the nasal side of the disk even in the course of temporal hemianopsia of long standing, altho in the eyes which normally have a temporal pallor, this difference in color between the nasal and temporal

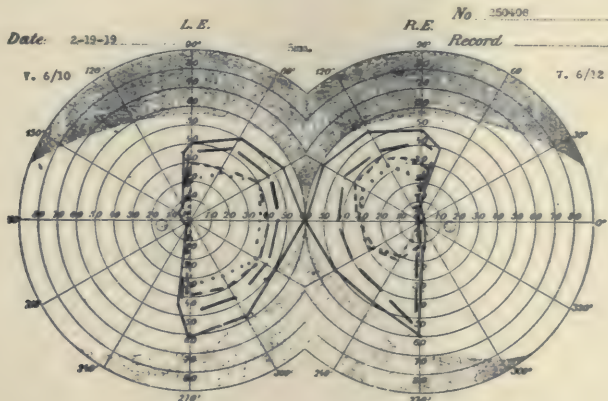


Fig. 8.—(Case 250408). Visual fields, Feb. 19, 1919.

sides of the disc may be accentuated. This is quite in keeping with the pathologic findings of Walker and Cushing, who record that "despite the so-called atrophic pallor of the disc in patients having visual field defects resulting from lesions in the chiasmal regions,

of diminished vision with field changes for three years, one for six months, and the other three for from only three to twelve weeks. In the greater number of cases, pallor of the disc may be expected to appear about the fourth month after the onset of visual symp-

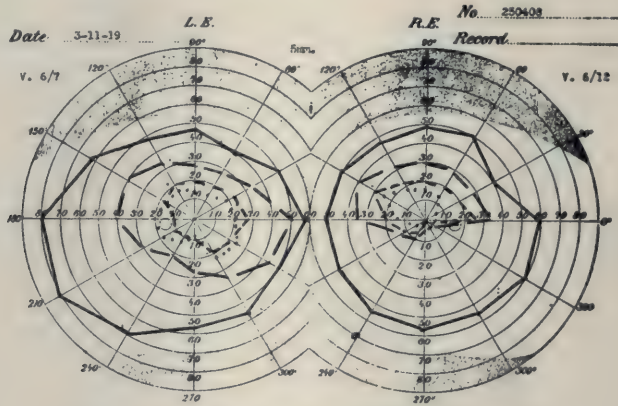


Fig. 9.—(Case 250408). Visual fields, March 11, 1919.

the histologic examination of the nerves fails to show the expected degree of fiber degeneration unless the progress has been of long duration."

What of the duration of visual symptoms of tumor before a pallor of the nerve head can be distinguished with the ophthalmoscope, and before the disc changes characteristic of true atrophy develop? Five of our patients had no appreciable change of the disc at the time of examination. One patient (Case 236675, Group 3) gave a history

toms. The longer the duration of visual disturbances before the appearance of disc pallor, the greater is the probability that a tumor is present which is slow growing. Atrophy of the optic nerves following shortly after the onset of visual changes indicates pressure rapidly produced, or pressure accompanied by processes that lead to early destruction of the optic tract. Since rapidly developed pressure is more likely to result from malignant tumor or cysts than from benign types of

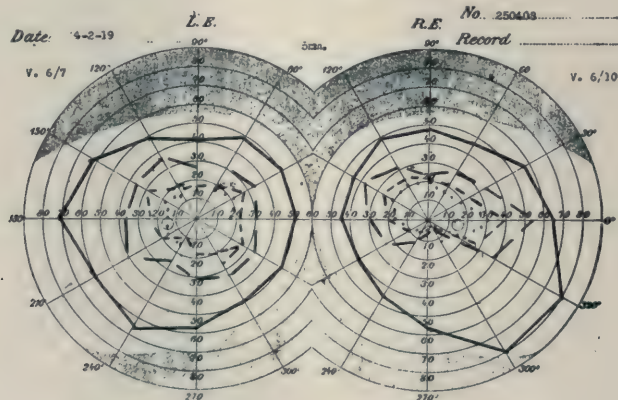


Fig. 10.—(Case 250408). Visual fields, April 2, 1919.

tumors, the prognosis in cases of beginning atrophy must be guarded. Optic atrophy of both eyes that finally ensues after long duration of visual symptoms will not be improved materially by removal of the pressure, so that the prime object to be attained by the operation is beyond reach, and operation for visual purposes should not be undertaken. The chief object, then, of the ophthalmoscopic examination is has the nerve undergone atrophy. The visual acuity and visual fields may not help in the prognosis in cases of low vision, and it must be determined by the amount of atrophic shrinkage alone whether the nerve will be in a condition to resume function when the cause of the pressure has been removed (Table 2).

Choked disc and neuritis were encountered in only one case.

CASE 219123.—A girl, aged 9, had had diabetes insipidus at the age of 5. Some twenty-four hour records showed that from 3 to 4 quarts of urine were passed daily; since then she had a tendency to drink freely at night and pass considerable urine, but not constant in degree. In October and November,

1917, she had an attack of mild headache with malaise lasting for from three to four days, during which time she vomited persistently and practically lost her vision in the right eye. Improvement followed in a few days. In December, the patient had another attack of vomiting, with malaise the following week. Jan. 1, 1918, she was blind in the left eye.

Examination revealed vision in the right eye to be 6/6; in the left, light perception. Direct light reflex was lost in the left eye, but was present in the right. The consensual reflex of the right pupil was lost; it was present in the left; convergence contraction was present in both. Examination of the fundus of the right eye showed the disc to be small, with a hazy margin; the nerve head was hyperemic, and the veins were tortuous; examination of the fundus of the left eye showed the nerve head to be swollen 2 diopters, and the veins tortuous. No hemorrhage was found in either eye. There was a temporal hemianopsia of the right eye, and indeterminate light perception somewhere in the temporal field of the left eye, indicating that

TABLE 2.—RELATION OF OPHTHALMOSCOPIC APPEARANCE OF THE NERVE HEADS AND DURATION OF VISUAL SYMPTOMS.

Case	Condition of Discs	Duration of Visual Symptoms	Condition of Sella in Roentgenogram	Pathologic Diagnosis
250408	Normal	3 weeks	Negative	Carcinoma
254897	Normal	4 months, right; 5 months, left	Negative	Cyst
234782	Normal	6 months; blindness 1 month; sight suddenly returned	Enlarged	Epithelioma
210605	Normal	5 weeks, left	Enlarged	Malignant tumor
236675	Normal	3 years	Enlarged with clinoids eroded	Glioma
265097	Atrophy	20 months	Enlarged	Garcinoma
205813	Atrophy	5 years; blind 6 months	Enlarged with clinoids eroded	No operation
216363	Atrophy (right eye)	2 years; blind 2½ years (right eye)	Complete destruction	Malignancy
262796	Atrophy	15 years, left; 1 year, right	Complete destruction	Gliosarcoma
251151	Atrophy	4 years	Complete destruction	No operation
45560	Atrophy	4 years, right; blindness 1 year; 10 days, left	Enlarged with clinoids eroded	Malignancy
219123	Choked Disc (left eye)	4 months, left; blindness 1 month	Partial destruction	Malignant tumor

there had been a right homonymous hemianopsia. At operation a "pituitary tumor was found situated underneath the optic commissure and left optic nerve elevating both. The growth was about 1.75 cm. in diameter. It had originated from the pituitary gland in the sella turcica and was extremely adherent to all the surrounding structures and without a definite line of demarcation. In two places the growth had broken thru the thin capsule over the tumor. It was necessary to drain the right ventricle on account of increased pressure, and about 1 ounce of grayish fluid was removed" (Adson). The tumor was reported by the pathologist to be malignant.

The choked disc in this case was evidently due to the increased pressure within the ventricles, which is a complication rarely encountered.

ROENTGENOGRAPHY.

Roentgenography of the head with especial attention to changes in the configuration of the sella turcica is of value in determining the extent of the damage to neighborhood structures and, as changes in the sella are commonly found to exist in pituitary tumor, it adds important evidence of the presence of such a tumor. It is well known that enlargement of

the sella, however, and even destruction of certain of its parts may result from other intracranial disorders. Likewise, a pituitary tumor of some size may be present and cause characteristic ocular phenomena without in any way changing the sella so as to make it appear abnormal by roentgenographic inspection. Six of our group of cases showed no sellar changes. Two of these patients had a "calcified pineal gland." The changes in the sella revealed by roentgenogram may be placed in four large groups: (1) no enlargement of the sella nor erosion of the base or clinoid processes (Table 3); (2) enlargement of the sella without erosion or destruction of bone (Table 4); (3) enlargement of the sella with thinning of the base and erosion of the clinoid processes (Table 5), and (4) complete destruction of the sella (Table 6).

The following are histories of cases tabulated in Table 3, Group 1, in which a diagnosis of pituitary tumor was made on the eye findings alone.

CASE 207279.—Mr. W., aged 42, a bank cashier, came to the clinic, Sept. 5, 1917, complaining of failing vision in both eyes. Before 1900 he found he was not reading with the right eye. He procured glasses, but vision in the eye

TABLE 3.—GROUP 1: CASES WITH NORMAL SELLA SHOWN IN ROENTGENOGRAM.

Case	— Vision —		Visual Fields	Pathologic Diagnosis
	Right Eye	Left Eye		
207279	C. f.*	6/15	Bitemporal hemianopsia	Cellular fibroma
270734	6/15	Nil	Temporal contraction (right eye)	Epithelioma
250408	6/30	6/15	Bitemporal hemianopsia	Carcinoma
254897	6/30	6/30	Bitemporal hemianopsia	Cyst
207683	1/60	Nil	Temporal contraction (right eye)	Sarcoma
295780		L. p.†	Temporal contraction (left eye)	No operation

* Counts fingers.

† Light perception.

TABLE 4.—GROUP 2: CASES WITH ENLARGED SELLA SHOWN IN ROENTGENOGRAM.

Case	— Vision —		Visual Fields	Pathologic Diagnosis
	Right Eye	Left Eye		
265097	1/60	5/60	Bitemporal hemianopsia	Carcinoma
201188	6/12	C. f.	Bitemporal hemianopsia	Carcinoma
234782	6/60	C. f.	Bitemporal hemianopsia	Epithelioma
		17 cm.		
239742	C. f.	6/6	Homonymous hemianopsia (right eye)	No operation
253290	6/10	C. f.	Bitemporal hemianopsia	Sarcoma
210605	6/7	C. f.	Temporal contraction (left eye)	Malignant tumor

was not improved. About 1913 or 1914, he noticed contraction of the visual field of the right eye, and some difficulty in reading with the left eye; for instance, when reading figures, if there were six figures, as \$1,250.40, he would call \$250.40. He was still able to keep books and tell time by his watch until May, 1916, when a diagnosis of optic atrophy was made by an oculist elsewhere, and the spinal fluid examined. He had not been able to read or tell time by his watch since then. At the time of his first examination at the clinic he could distinguish moving objects with his right eye; vision in the left eye was 6/15—2. The field showed a well marked bitemporal hemianopsia. Both nerve heads were pale, the right having less color than the left, with some shrinkage of the nerve of the

right eye. A roentgenogram of the head showed the sella to be normal. A general physical and neurologic examination detected no changes due to disorders of the pituitary secretion, nor evidences of brain tumor. Because of the appearance of the nerve heads and the visual fields, the patient was operated on, Oct. 10, 1917 (Adson). "A large greenish-red tumor was found underneath the optic commissure and compressing the right optic nerve. It was composed of some glandular tissue and a considerable amount of fibrinous tissue, and was fairly well encapsulated and markedly adherent to the commissure and to the right optic nerve."

CASE 250408 (Continued).—A roentgenogram of the head showed the sella to be negative, but disclosed a large calcified pineal body. The nasal ac-

TABLE 5.—GROUP 3: CASES WITH ENLARGED SELLA AND THINNING OF THE BASE AND EROSION OF THE CLINOID PROCESSES SHOWN IN ROENTGENOGRAM.

Case	— Vision —		Visual Fields	Pathologic Diagnosis
	Right Eye	Left Eye		
219123	6/6	L. p.	Bitemporal hemianopsia	Carcinoma or sarcoma
201329	L. P.	C. f.	Temporal hemianopsia (right eye); contraction (left eye)	No operation
204823	6/6	6/15	Left homonymous hemianopsia	No operation
205813	C. f.	Nil	Temporal hemianopsia (right eye)	No operation
45560	Nil	6/10+2	Temporal hemianopsia with contraction (left eye)	Malignancy
236675	6/30—1	6/20+2	Bitemporal hemianopsia	Glioma
271683	M. o.	6/30	Bitemporal hemianopsia	Carcinoma
25558	6/12	6/60	Bitemporal hemianopsia	No operation
257278	6/15	6/60	Bitemporal hemianopsia	Carcinoma
248126	L. p.	1/60	Bitemporal hemianopsia	Carcinoma
268798	6/6	C. f.	Bitemporal hemianopsia	Sarcoma
293423	3/60	6/15	Bitemporal hemianopsia (atypical)	Glioma
288874			Bitemporal hemianopsia	Malignant cellular tumor

TABLE 6.—GROUP 4: CASES WITH COMPLETE DESTRUCTION OF SELLA SHOWN IN ROENTGENOGRAM.

Case	— Vision —		Visual Fields	Pathologic Diagnosis
	Right Eye	Left Eye		
216363	Nil	6/7	Temporal hemianopsia (left eye)	Soft extradural tumor
253633	6/30	6/60	Bitemporal hemianopsia	Sarcoma
262796	6/60+	C. f.	Contraction (right eye), temporal hemianopsia (left eye)	Gliosarcoma
245366	L. p.	M. o.†	Small triangle fourth quadrant (right eye)	Glioma
251151	3/60	Nil	Temporal hemianopsia (right eye)	No operation
274037	6/60	Nil	Marked temporal contraction (right eye)	No operation
35174	6/5	M. o.	Bitemporal hemianopsia	No operation

† Moving objects.

cessory sinuses had been exenterated, following which the visual acuity improved and the size of the visual fields increased temporarily. Because of the appearance of the nerve heads (absence of neuritis) and the visual fields, the patient was operated on, Feb. 22, 1919, for pituitary tumor (Adson). "On exploring the optic commissure, the tumor was found bulging in front and pressing out laterally on each optic nerve. The upper portion of the tumor was very cystic, so that a depression was made on either side by the optic nerve. The tumor was not adherent either to the optic nerves or commissure. About 2 drams of watery fluid escaped when the capsule of the tumor was opened."

CASE 254897.—Mr. D., aged 38, a contractor, came to the clinic, Jan. 3, 1919, with a diagnosis of pituitary tumor made elsewhere. The trouble had begun in the spring of 1918. At that time he was sick for several days, drank large quantities of water, and passed a large amount of urine. In April he had "catarrhal fever," for which he was in the hospital for more than a week. He apparently recovered from that condition, but his home physician sent him to a neurologist who "gave him tablets to absorb a tumor in the head, back of the eye." He had not had much headache until the last two months. Early in August, 1918, he first noticed that the temporal field of the left eye was becoming blind, followed by loss of visual acuity, judged by the fact that he could not see to read with that eye. By November 1 the vision of the right eye was very much reduced. During the last six months of 1918 he had noticed loss of libido; the sexual organs seemed to be getting smaller and he was always drowsy. At the time of examination at the clinic the patient could tell time by his watch, a radiolite, with the right eye. Vision in the right eye was 4/200, in the left, 2/200. The fields showed bitemporal hemianopsia with definite vertical division thru the macular region. Ophthalmoscopic examination showed the nerve heads to be round. No swelling, no atrophy, nor injection was present. The nerve

heads were only very slightly pale, without shrinkage of the substance of the nerve itself.

A roentgenogram of the head showed the sella to be normal, a calcified pineal gland being present. Jan. 18, 1919, operation was done (Adson). "The commissure which was brought into view presented a brownish cystic mass situated underneath and between the optic peduncles. The mass was about 2.5 cm. in diameter and contained a golden gelatinous material. Two small solid bodies were removed which had apparently originated in the pituitary gland. These proved to be carcinoma on microscopic examination."

CASE 207683.—Mrs. S., aged 28, came to the clinic, Sept. 10, 1917, complaining of loss of vision in the left eye and of partial loss in the right eye. She had some constitutional evidence of dyspituitarism, such as gain in weight, in the past four years, and menstrual disturbances since June, 1917. She had been without eye trouble until June, 1916, when she noticed failing of vision in the left eye. By May, 1917, sight was entirely gone from the left eye and markedly diminished in the right eye. After some treatment by a local physician, the vision of the right eye returned to normal for a while, began again to diminish, and gradually became worse. The patient stated that five days previous to examination in the clinic vision in the right eye was 20/200. On first examination the vision in the right eye was 1/60, in the left, nil. The external appearance of the eyes was normal; the pupils were equal, and normal in size, shape, and position. The pupil of the right eye reacted to direct light stimulation and in accommodation; there was no consensual reflex. The left pupil reacted to consensual light and accommodation, but not to direct light. Examination of the right eye showed the media to be clear, the nerve head round, of a waxy pallor, and without loss of substance. The disc margins were well defined. The fundus was otherwise normal. The nerve head of the left eye was round, pale thruout, but without loss of substance; the disc margins

were well defined. No other fundus lesion was present.

A roentgenogram of the head showed the sella to be normal. The patient was operated on, Oct. 1, 1917 (Adson). "A dark red, nodular, extremely vascular, completely encapsulated tumor, about 1.85 cm. in diameter, was found situated anterior to but beneath the optic commissure, elevating the optic nerve and commissure. The right optic nerve was large and edematous (one and one-half times as large as the normal nerve). This tumor was entirely separate from the brain substance, but appeared to be adherent to the right anterior portion of the sella turcica." Microscopic diagnosis of the tissue removed was sarcoma.

CASE 270734.—Mrs. R., aged 48, examined at the clinic, May 12, 1919, complained of loss of vision in the left eye and greatly diminished vision in the right eye. In July, 1916, the patient had had severe headaches with nausea and vomiting for one day. She received medical treatment for goiter for two weeks, after which she noticed that the vision of her left eye was becoming dim. It seemed to diminish from the temporal side. The following March she had her eyes tested for glasses, and was told that vision in the right eye could not be improved.

At the time of examination at the clinic, her vision in the right eye was 6/15, in the left, nil. The right field showed, with the 5 mm. test object at 290 mm., preservation of a small portion of the upper inner quadrant and about one half of the lower inner quadrant. With a 20 mm. test object, there was contraction to between from 40 to 50 degrees of both upper quadrants and the lower outer quadrant, with a large absolute scotoma in the temporal half of the field. The ophthalmoscopic examination showed marked uniform pallor of the nerve heads without loss of substance. There were no other fundus changes. The central nervous system examination was negative except for eye findings. The general physical examination gave no evidence of disturbances which could be attributed to changes in pituitary secretion. June

21, 1919, the patient was operated on for pituitary tumor (Adson). "An encapsulated tumor of reddish granular appearance was found bulging between the two optic peduncles which, when dissected out, left the optic peduncles perfectly free." Microscopic diagnosis of the tissue removed was epithelioma.

CASE 295780.—Mrs. H., aged 49, came to the clinic, Nov. 7, 1919. The diagnosis of tumor of the hypophysis was made elsewhere from the appearance of the visual fields and general constitutional disturbances due to disorders of secretion. It was questionable whether the right eye retained light perception; vision in the left eye was 6/60. The field of the left eye showed a complete temporal hemianopsia with the dividing line exactly at 90 degrees thru the point of fixation. Ophthalmoscopic examination showed small normal pink nerve heads, with clearly defined margins. There was no pallor, no suggestion of atrophy, nor evidence of a previous neuritis, but a moderate retinal arteriosclerosis was present.

The roentgenogram of the head showed the sella to be unchanged. Dr. Wilder reports: "This certainly is an endocrinal disturbance, probably pituitary, with a question as to the presence of early acromegaly." The metabolic rate was —23. There was strong evidence of cerebral arteriosclerosis, emaciation, and general debility. Pituitary operation was deferred.

The greater number of the cases in this series fall into Groups 2 and 3. It is difficult to diagnose enlargement of the sella because of the variation in the size of normal sellas, and in cases in which no erosion has taken place it is often necessary to rely on one's judgment of the appearance of the sella in relation to other bony parts of the skull as to whether enlargement exists. With thinning of the base of the sella, however, and particularly if the clinoid processes are shortened or eroded, there is very little difficulty in noting the change. Judgment of the condition of the sella should be passed only after examination of stereoscopic plates, although frequently the condition is apparent from a single plate. A comparison

of the group convinces that the amount of bony change wrought on the sella by the tumor gives little indication of the type of tumor to be dealt with, although well marked changes, such as in Group 4, forewarn that pathologic changes are extensive and the prognosis is quite grave.

SUMMARY.

The final diagnosis of pituitary tumor seldom rests entirely with the ophthalmologist. However, his responsibility is clear. There should be the closest relationship between the ophthalmologist, the neurologist, and the surgeon in reviewing the results of examination of cases of suspected pituitary tumor. Pallor of the discs and changes in the visual fields should al-

ways incite suspicion of pressure processes, the etiology of which should be ascribed less hastily to tabes and other neuritic processes. The ocular examination should be carefully carried out before roentgenograms or general physical and neurologic examinations are made, but no case should be diagnosed on the eye findings alone.

Ocular phenomena from pituitary tumor, however, often develop early in the course of the disease, and should be recognized by the oculist. The decision on operation should properly rest on the changes in the field and the appearance of the optic discs, since the indications for operation disappear with the development of optic atrophy that makes restoration of visual function impossible.

UNIFORMITY IN THE ESSENTIALS OF PERIMETRY

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This paper urges the importance of standardizing perimetric methods with reference to the illumination and the definiteness of the colors used, and the expression of the size of the test object in an angular rather than a linear unit. Read before the College of Physicians of Philadelphia, Feb. 19, 1920 (see p. 524).

The value of a scientific principle or instrument is usually apparent in the modifications which either principle or instrument may undergo as each one comprehends its value. The numerous stereoscopes, which have been offered to the profession during the last three quarters of a century, pay tribute to the value and necessity of this instrument in the practice of ophthalmology. The same may be said of the perimeter and, paradoxically as it may seem, the multiplicity of instruments and methods offered to the profession furnishes the strongest possible evidence of what the profession as a whole thinks of the value of perimetry as a diagnostic aid even though it is not uniformly practiced.

It is not essential that we all adopt the same methods of study if the conclusions arrived at by devious paths are uniform. Our language, however, should be the same and the conclusions reached should be expressed in definite

and known terms in order that facts deduced from our studies may have broad scientific values. This has not been the order of the day in perimetry largely because of a lack of uniformity in the very essentials of its practice. The drawing of conclusions correctly depends primarily on the premise. If that is correctly stated there is apt to be a uniformity in the conclusions at which we arrive. If the premise is vague or incorrect, conclusions are also apt to be faulty.

In the practice of perimetric methods in America, in Europe or in any part of the scientific world, there are three things about which we should definitely agree. They are: first, the character of the illumination or the light conditions under which studies are made; second, definiteness in the colors used, expressed in scientific language; and, third, accuracy in the size of the test objects employed, expressed in degrees rather than in linear measure.

In the AMERICAN JOURNAL OF OPHTHALMOLOGY, March 1918, the author briefly discussed the first of these propositions. There are probably not two offices equally illuminated either by natural daylight or by artificial illumination. Of "sunlight," Parsons says (*An introduction to the Study of Color Vision*, page 4) "it varies much—the variations being not only in intensity but also in composition, owing to the unequal absorption of different rays by the atmosphere, and this absorption again varies greatly according to the amount and nature of the matter suspended in the air." There is no uniformity in sunlight either in any particular locality at different times of the day, or at the same time on successive days, and there is much less uniformity in different communities.

Added to this uncertainty is the great variability of the quantity of sunlight admitted to rooms and the great changes which it undergoes by the contents of the room. It is a logical conclusion, therefore, that in our effort to obtain a light which at least may be made approximately uniform we must turn to artificial illumination to solve the problem. Filters, which have been scientifically prepared to approximate sunlight under certain standard conditions, naturally are the logical source to which we turn for help. In doing this we not only encounter considerable variability but become entangled unfortunately in commercial difficulties. In the brief paper referred to above, by unwittingly recommending a certain screen which seemed to be perhaps the best that we had at our disposal, the author aroused the ire of competing firms, which led to unpleasant correspondence. The fact remains, however, that some definitely approved filter should be uniformly adopted as our standard and this should be determined and standardized by spectrum analysis.

The adoption of such a filter will not solve all our problems. It will not be possible to obtain uniformity in intensity both because a definite measure will be impracticable and because of

the deterioration of the source of illumination. The adoption, however, of a specific filter and a fairly definite source of illumination will at least bring about an approximate state of uniformity which can not now be approached by our varied and individual methods of illumination. Any standard which may be adopted will vary to some extent. For practical purposes, however, a definite filter of known efficiency, definite candle power to the square foot of surface to be illuminated and arranged at a definite distance from the tangent screen, will insure sufficient uniformity from which to draw conclusions.

The second and third propositions admit of more definite and satisfactory solution. In the matter of colors, there has been no concerted attempt made, to the author's knowledge, to state in exact language the colors which should be used. Wilbrand in Norris and Oliver, recommends the Heidelberg flower papers. There is, however, no reference in definite terms as to what particular tone, expressed in wave lengths, should be used. Red, for example, begins at the junction with orange $656\mu\mu$ and ends in extreme red at $760\mu\mu$. The test objects for red sold on the market are possibly not found in these extreme ends of the red but certainly have too wide a latitude of variation to bring about uniform results. The same is true of green and blue.

Altho color pigments will vary considerably, just as transmitted colors, the colors selected for perimetric work should be expressed in definite wave lengths, and these definite hues should be uniformly employed in the making up of perimetric instruments. In selecting our standards one must bear in mind that practicality is a prerequisite. If we had in mind purely laboratories' methods, the task would be easier and possibly pure spectral colors could be employed. In practice, however, pigments must be used, and purity in color can not be ideally obtained. It would seem possible, however, to express the tone of the pigments in language sufficiently definite to insure at least approximately uniform colors. In order that the proper

tone be maintained, the pigmented papers which are employed could be subjected to tests by the spectroscope, and an efficient standard might thereby be maintained.

It has been suggested that the red and green adopted in the semaphore and signal lights on our railroads could be used for this purpose. Our needs, however, are entirely different. In signal lights both red and green are selected with a view to the counterbalancing of an excess of the blue in the blue-green, for example, by the yellow in the kerosene lamps used. The same is true of red. The average red employed approximates 700μ . This is too dark. It should be more in the direction of the orange about 670μ . Green is a better tone and is mostly found around 522μ . I believe this likewise is too far to the yellow side. 468μ would be an average blue. These are only suggestions. Definite wave lengths should be recommended by a commission and adopted by our ophthalmologic bodies in an effort to obtain uniformity. If left to individual selection our colors will remain unstandardized and the present unsatisfactory state of affairs will continue to exist.

As the intensity of the light gives brightness to the object up to a certain point, it changes the hue or tone as well as purity of a color beyond a given point. For this reason transmitted illumination does not tend to uniformity, and it is the writer's belief that transmitted illumination on perimeters should not be employed. It adds to the variability which we are endeavoring to reduce to a minimum. Further objection to test objects thus illuminated lies in the size of the carriage containing the object. It is totally lacking in the delicacy and precision made possible in the test object carriers furnished, for example, with Lloyd's stereo-campimeter—indestructible knife edge objects, minute, accurate and unobtrusive. A third valid objection can be raised against transmitted illumination. With the exception of red glass properly treated, transmitted illumination is open to the

same objection as that of pigments, namely, impurity of the color. It is perhaps a little easier to obtain purer tones by means of transmitted light than pigments for laboratory purposes, but the same objection obtains; and for practical purposes the problem would be even more complicated than that of pigments, with added objections from which the pigments are exempt.

The size of the test objects employed varies even more than the color tones. This is due largely to the method of study. Bjerrum, for example, used a 1 mm. test object at a two meter distance and a 5 or 1 mm. test object is recommended by others for use on a perimeter of a 333 mm. radius. Between the instruments of shortest radius the Schweigger hand perimeter and Peter's hand campimeter, both of which have a radius of 165 mm.; and the Bjerrum screen of 2,000 mm. radius, there are a considerable number of perimeters and tangent screens of varying radii. To designate the diameter of the test object in millimeters, therefore, used on any particular instrument gives one but a very indefinite value when compared with an instrument of a longer or shorter radius. Expressing the size of the test object in the square surface exposed to the eye, as employed by a few, adds nothing in uniformity to the measure of the diameter.

As all measurements of fields are made on an arc of a circle or a tangent of the same, the language is always in degrees or fractions of degrees. There is no good reason, therefore, but habit, why the test object should not also be expressed in the same language, i.e., in degrees, minutes or seconds subtended by the test object on any particular arc. The value of this change in our nomenclature must at once become apparent. Test objects would be properly adapted to the radius of the arc for which they are intended. A 30' test object suitable for use on Schweigger's hand perimeter or Peter's hand campimeter would be equivalent to our present 1.5 mm. object. On Lloyd's stereo-slate the test object would meas-

ure 1.8 mm.; on the average perimeter of 333 mm. radius the test object would measure 2.9 mm. and at 1,000 mm. or one meter the object would be 8.7 mm. in diameter. These values need not be remembered as each instrument and its equipment would be constructed on a scientific basis, and test objects of 30', 1°, 2° and 3° would be furnished with each type of perimeter or tangent screen.

It may seem to some that the linear measure might appropriately be retained for tangent work inasmuch as the length of the tangent included between the radius and secant may be expressed in linear measure. The tangent, however, is forced upon us by its greater flexibility and for the sake of uniformity our terminology should be the same whether the arc or tangent perimeter is employed, as the angle subtended is regarded as the same in either case.

It requires no stretch of the imagination to calculate the enhanced value which this system must necessarily give to perimetric literature, and the simplicity and uniformity which would be added to our own individual methods. It would furnish us with a uniform language which all would understand.

The makers of the Lloyd stereo-campimeter and the Peter hand campimeter are making these necessary changes in the interests of more scientific methods than are now employed, and it is hoped that other makers of perimeters and campimeters will adopt this uniform method.

If we can secure concerted action on the question of illumination, on the standardizing of colors and on the adoption of this uniform method of designating the size of the test object, perimetry will offer even more as a diagnostic aid than we have conceded to it in the past.

OCULAR NOTES ON LETHARGIC ENCEPHALITIS, WITH TWO CASE REPORTS

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This account of the disease with the report of two cases points out the difficulty in discriminating between lethargic encephalitis and syphilis as the cause of the ocular symptoms.

The symptom complex known as lethargic encephalitis is at this time being broadly and methodically studied by the neurologist and no doubt he will bring much to light regarding this comparatively new disease, if indeed it is new. At the same time it should be very minutely observed by the ophthalmologist, for in a large percentage of cases the latter is the first to see the patient, and the symptoms that are first noticed are apt to be confined entirely to the eyes.

It would be interesting to know how many mild cases of this condition have been diagnosed syphilis of the central nervous system and treated as such, and their recovery put down as another victory for mercury and the arsenol compounds. It is quite possible also that

some cases of syphilis have been diagnosed as the other condition and the patient suffered thereby; but the burden of proof lies in the direction of the encephalitis being mistaken for lues rather than the reverse.

Early in the disease differentiation is difficult, as the predominating symptom of both conditions is partial or complete paralysis of the external ocular muscles. Most commonly those supplied by the third cranial nerve are affected. But this is not constant, nor has it any diagnostic value, as the pathology of both diseases is a toxic process attacking the motor nuclei of the nerves, and as their grouping covers but a relatively small area, it may just as well attack one as the other or all of them, and this last is

indeed the case, as a rule. A very important difference seems to be the matter of the permanence of the paralysis. In the luetic type the lesion is generally of long standing before it yields to treatment, or at least before any appreciable change is noted, while in the lethargic type the paralysis is fleeting; and may shift from one muscle to another in the period of a week, or even less, as in the case reported below.

The second case reported is interesting in that the only ocular symptom noted is the persistent paralysis of the left iris to light stimulation. This typical Argyll Robertson pupil has withstood all attempts to prove that it is due to syphilis, in spite of the overwhelming weight that literature gives to the evidence.

Repeated blood and spinal Wassermanns have been returned negative. Provocative doses of mercury and arsenol preparations have failed to return a positive Wassermann. Competent neurologic examination has failed to bring out further evidence of syphilis. The most searching cross examination has given no history that could possibly be construed syphilitic.

CASE 1. Mr. — was referred to the writer by his physician, Jan. 16, 1920. He complained that the day before he suddenly noticed that he saw double. Had never before had any ocular complaint, nor had he ever worn correction for refractive error, and was in good health at the time. No history of venereal disease, married and has one healthy child. Only illness remembered was a few years previous when he had an infected arm, and was forced to have it incised. Complete recovery.

Examination: Healthy appearing man, aged 26, weight 180 lbs. No physical disability, other than double vision complained of. Pupils reacted well to light and accommodation. Scopolamin 1/5% sol. was instilled and after forty-five minutes, examination revealed the following: Inspection negative. Limitation of movement of right eye externally. Cover test showed marked esophoria. Fundus normal in each eye.

Refracted R. +0.37 \bigcirc +0.50 ax 90.

L. +1.00 \bigcirc +0.25 ax 90.

With Maddox rod and rotary prisms an esophoria of 25 prism degrees, and a left hypophoria of 3 prism degrees, were noted. Patient continued to see double.

Atropin was prescribed and patient confined to bed on light diet pending report from spinal and blood Wassermann reactions.

Jan. 19 esophoria of 12 degrees, L. H. of 2 degrees. Jan. 22, esophoria of 8 degrees, L. H. of 1 degree. Jan 24, esophoria of 3 degrees, no L. H.

Patient no longer saw double and was apparently recovered. He now insisted on returning to work and his correction was prescribed.

On Jan. 26 patient again returned complaining of double vision. Examination now revealed esophoria 16 degrees. Jan. 28, esophoria of 28 prism degrees, L. H. of 2 degrees. Jan 31, esophoria of 25 prism degrees, L. H. of 2 degrees. Feb. 2, esophoria of 22 prism degrees, L. H. of 2 degrees. Feb. 4, esophoria of 20 prism degrees, L. H. of 2 degrees. Feb. 6, esophoria of 16 prism degrees, L. H. of 1 degree. Feb. 8, esophoria of 8 prism degrees, L. H. of 0 degrees. Feb. 9, esophoria of 2 prism degrees, L. H. of 0 degrees.

The patient now had comfort and freedom from his diplopia until Feb. 22, when he again returned complaining of double vision and its attendant asthenopia. At this time examination showed an exophoria of 12 prism degrees and a left hypophoria of 4 prism degrees. During this last period the eyes were not kept at rest by means of a cycloplegic, but a ground glass was worn over left eye.

Wassermann reactions were returned negative. Other ophthalmologists were called in consultation and verified the above findings. Not being satisfied in my own mind as to the cause of this peculiar fleeting symptom complex, I referred the patient to the Neurological Institute in New York City, and a week later received a most complete report from Dr. J. W. Stephenson with the diagnosis of lethargic encephalitis. After treatment as advised by the neurologist, the patient gradually improved, until the muscle

balance was again normal and to date it has remained so.

During the first week while the patient was under instillations of atropin, he mentioned once or twice that he was drowsy, and he seemed at times mildly "out of his head" as he talked at times of vague and irrelevant matters while conversing with members of his family. This peculiarity was attributed to an idiosyncrasy toward atropin and the medication was changed, upon which the symptoms disappeared. This was no doubt the most important symptom representing the actual condition, yet it has probably been many times attributed to medication, when in reality it was the basis of a correct diagnosis.

CASE 2. Miss —, age 33 years. No history of previous illness, other than ordinary diseases of childhood. Venereal disease denied. Has led a rather sedentary life, very little outdoor exercise.

Two weeks previous to the consultation patient noticed while before the mirror, that the pupil of the left eye seemed larger than that of the right. No apparent visual defect noticed subjectively. Examination revealed typical Argyll-Robertson pupil in left eye. Light reaction totally abolished. Reaction to accommodation retained. Vision uncorrected was normal. Under cycloplegia vision is normal with

the addition of plus half diopter spheres. External muscle balance is normal. Fundus reveals no abnormality. Perimetric examination was normal for red, white, and green. Both pupils reacted readily to scopolomin as a cycloplegic, and loss of accommodation obtained for a period of six days. At the end of this time eserine reduced both pupils to pin point, in about half an hour.

Both blood and spinal complement fixation tests were negative. Second provocative tests were also returned negative. Careful physical examination by an internist revealed nothing worthy of note. Report returned from the neurologist is strongly in favor of a diagnosis of a mild case of lethargic encephalitis. Based on the pupillary dyscrasia, a history of slowing up of general reaction time, tendency toward drowsiness during the day, even after a full night's sleep, and absolute absence of anything that could be attributed to syphilis.

After a period of treatment extending over seven weeks, including courses of strychnin nitrate, and pituitary extract (Armour), the improvement is most satisfactory, the pupil now reacting to light and showing the enlargement only in the presence of a very brilliant sunlight or a strong artificial illumination.

THE ORIGIN OF THE VITREOUS

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The current conflicting views with regard to the development of the vitreous are here discussed by the light afforded through histologic study of an anomalous case. Presented before the Section on Anatomy and Anthropology of the China Medical Missionary Association at its Biennial Conference in Peking, China, February 21-28, 1920.

In 1917 the writer reported a case from the pathologic laboratory of the Massachusetts Charitable Eye and Ear Infirmary, showing a large number of interesting congenital anomalies in an eye which had been removed from an infant five weeks old because of suspected glioma. The histologic examination revealed that the white glistening body which had been seen without as

well as with the aid of an ophthalmoscope, proved to be not a glioma but a dense fibro-vascular sheath on the posterior surface of the lens. (Fig. 1.)

The unique morphology of the vitreous of this case seems worthy of further study and report, inasmuch as it appears to throw light upon a much disputed embryologic question, i.e. the origin of the vitreous; hence this paper.

The eyeball was sectioned as a whole in the horizontal antero-posterior position. The stained sections show that the vitreous body had retracted on account of the formalin fixation, leaving about the posterior one-fourth of the chamber free except for a small amount of coagulated serum and albuminous precipitate. It had also retracted to-

has proliferated horizontally along the zonular fibers and has formed contact with the ciliary processes on the temporal side (Fig. 3) and with Lange's fold on the nasal side (Fig. 4). Sections stained with Verhoeff's¹⁴ elastic-fiber tissue stain show distinctly many elastic fibers in this sheath. A few elastic fibers are even found mingled

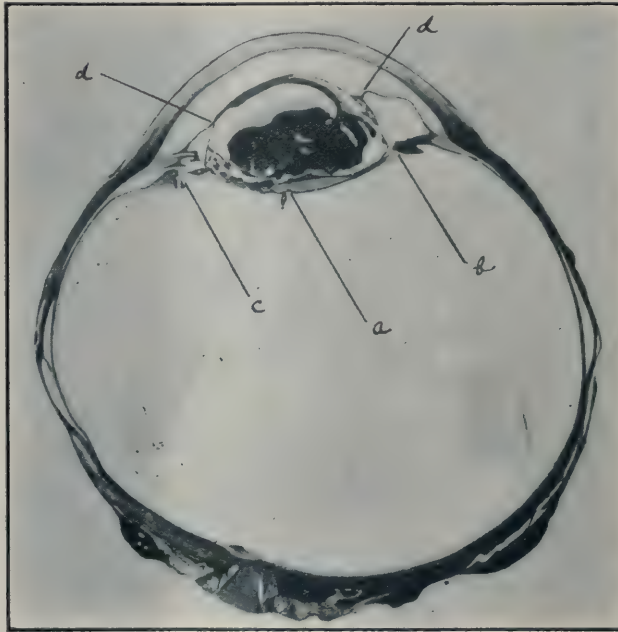


Fig. 1.—a. Fibrovascular sheath of the lens showing stub of hyaloid artery. b. Adhesion of sheath to ciliary body. c. Adhesion of sheath to transitional retina. d. Posterior synechia. (x 4.5).

wards the periphery, thereby creating a V-shaped vitreous-free space, in the center of the chamber. This space also contains coagulum.

Examination of the lens shows a cortical cataract. Posteriorly it is covered with a persistent tunica vasculosa lentis, which, on account of a marked proliferation of its connective tissue cells, has become a thick fibro-vascular sheath (Fig. 2). Near its posterior pole the lens capsule has ruptured. Thru the ruptured area connective tissue cells from the sheath have proliferated to a depth of 0.48 mm. The maximum thickness of the sheath external to the capsule is 0.36 mm. In some places the sheath extends peripherally to the equator of the lens. In other places it

with the spindle cells that make contact with one of the ciliary processes. Thruout the sheath are found cross sections of vessels whose lumens are filled with blood. Near the posterior pole of the lens sheath is a persistent hyaloid artery whose lumen also contains blood cells (Figs. 2 and 3).

The vitreous fibers were brought out in a remarkable manner by a special method of staining suggested by Verhoeff of Boston, thru whose courtesy I have the opportunity of presenting this case. The sections selected were first bleached by Verhoeff and Fisher's method, then stained for four hours in Verhoeff's elastic tissue stain, differentiated in a one per cent solution of

ferric chlorid, and counterstained in eosin.

Three varieties of vitreous fibers, distinguished according to their position and morphology, were found to exist:

1. The first are the protoplasmic connecting processes found between folds of transitional retina adjacent to the ciliary body. It appears as tho the internal surfaces of these folds had at one time been in mutual contact, and

ing certain areas on the temporal side, where there are no obstructions like the folds of Lange which are found on the nasal side, to prevent their uninterrupted course backward along the periphery of the vitreous chamber.

3. The third variety is composed of fibers which originate from the cells of the persistent tunica vasculosa lentis (Fig. 6). These fibers are in general much larger and coarser than the other



Fig. 2.—Patent hyaloid artery and thick fibrovascular sheath on posterior surface of cataractous lens. (x 50).

subsequently separated as the eyeball grew, except for the basal processes of the cells which stretched out into long cones and finally into fine protoplasmic threads. These are best seen in horizontal peripheral sections where the embryonic retina is formed into many lateral plications (Fig. 5).

2. The second variety consists of very delicate fibers which appear to come from the ciliary epithelial cells found in the region of the junction of the orbicularis and the first ciliary process. These fibres sweeping backward in close proximity to the retina are inserted one by one into the internal limiting membrane of that structure. Their number from before backward gradually becomes less until finally they disappear entirely. This variety of fibers is best seen in sections show-

ing two varieties. In the region of the posterior pole of the lens and the central axis of the globe, the fibers are the coarsest. Extending from the region of the posterior pole of the lens to the periphery of the fibro-vascular sheath, the fibers gradually become finer but more numerous. They also become finer and finer as they proceed backward in the chamber until finally, viewed with the high power of the microscope, they seem to lose their individual identity. Even then it is possible to see from the differential stain that the fibers as a mass have broken away from their insertion into the hyaloid membrane, and have retracted leaving spaces containing coagulum only. The growth of these fibers has taken place in such a way that the outer fibers, which are the finer, were

pressed gradually more and more towards the periphery, by the more rapidly growing and consequently the coarser central fibers. The outermost of these fibers are either in contact with or lie parallel to those of the second variety in their concentric arrangement. Several of the outer fibers are nucleated at or near their origins in the fibro-vascular sheath (Fig. 4). There are also irregular cross anastomotic

superficial ectoderm contributing towards the formation of the vitreous.

In 1879 Herzog⁴ stated he believed that the vitreous is developed from the cells of the retina. About twenty years later Carini³ supported Schoeler's mesodermal theory, while Tornatola¹³ and Rabl¹⁰ supported Herzog's theory of ectodermal origin. Tornatola, denying the existence of an internal limiting membrane of the retina, stated that the

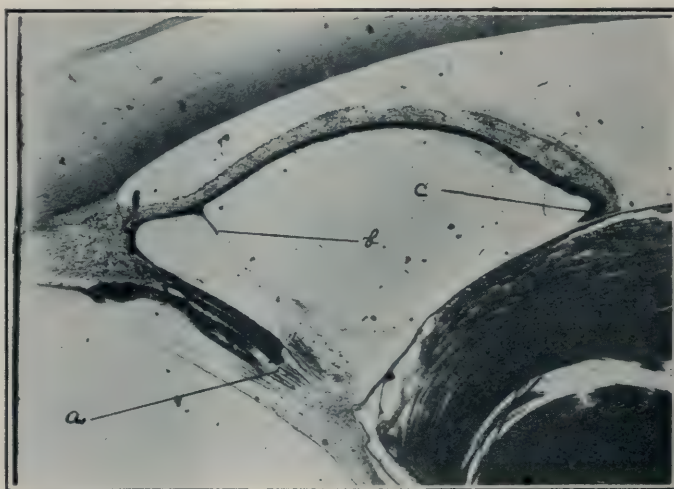


Fig. 3.—Temporal view of lens, iris and ciliary body. a. Fibrovascular sheath attached to ciliary processes. b. Iris processes attached to lens. c. Posterior synechia and entropion uveae. (x 30.)

fibers which appear to have had their origin in some structure which had *intra vitam* occupied the central axis of the vitreous chamber. The unfortunate disappearance of this structure, which undoubtedly was a mass of persistent hyaloid vessels, must be considered an artefact.

THEORIES CONCERNING ORIGIN OF VITREOUS.

In 1848 Schoeler¹¹ advanced the theory of the mesodermal origin of the vitreous. He held that embryonic connective tissue gains entrance into the globe thru the fetal cleft, and the narrow space between the primitive lens and the margin of the secondary optic vesicle. His theory also includes the possibility of a layer of mesoderm between the primary optic vesicle and the

innermost cells of the embryonic retina are the source of origin of the vitreous and that from these cells little fibers grow out which thru numerous anastomoses form the vitreous. Rabl held that the first appearance of the vitreous takes place in the neighborhood of the retina ciliaris prior to the appearance of mesoderm in the secondary optic vesicle.

Since the beginning of the twentieth century, a number of others have written ten on the development of the vitreous. Wolfrum,¹⁶ von Szily,¹² and Addario¹ consider the vitreous to have a retinal origin. They believe that the fine protoplasmic connecting processes, found between the lens primordium and the inner layer of the optic cup in the very young embryo, represent the primitive vitreous; also that coincident with the

progressive histologic differentiation of the retina, the power of the latter to form vitreous progressively diminishes, from the region of the optic stalk towards the pars caeca retinae. The final vitreous source, they believe, is confined entirely to the pars ciliaris retinae.

Magitot⁸ and Mawas⁹ classify the vitreous chronologically into three divisions, viz.: (1) The primitive or prim-

opinion, therefore, briefly is that the vitreous is directly and entirely of retinal origin and that both vitreous and retina are to be considered a part of the central nervous system.

Other writers postulate the mixed development, i.e., the partly ectodermal and the partly mesodermal structure of the vitreous. Lenhossék⁷ advances the theory that the entire vitreous body, except the hyaloid canal, is derived

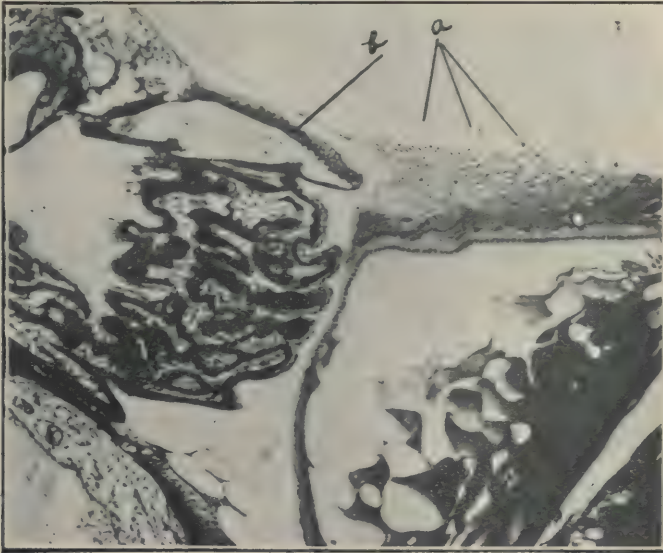


Fig. 4.—Nasal view of lens and adjoining structure. a. Nucleated vitreous fibres coming from fibrovascular sheath of the lens. b. Rudimentary retina attached to fibrovascular sheath (x 130).

ordial vitreous, which is a product of the marginal zone of the embryonal retina. This vitreous is short-lived and has apparently disappeared by the time the embryo attains the length of 12mm. (2) The transitory or neuroglia vitreous, which is marked by a proliferation of Müller's cells into the vitreous chamber and by the growth of a mantle or neuroglia which, according to these authors, appears at the end of the eighth week and envelops the entire hyaloid vascular system. When this system later disappears, the associated neuroglia vitreous also disappears. (3) The final or definitive vitreous, which develops as a fibrillary formation from the entire inner surface of the retina, especially the ciliary portion. Their

from the primordial lens by the formation of basal cones from which sprout fine little fibers. He considers the hyaloid canal to be the only mesodermal part of the vitreous and that the cells composing it enter with the hyaloid vessels. Kölliker⁶ also advocates the theory of the double development, but believes that the ectodermal part is derived, not from the lens, but from the retina.

Bach,² in a joint work with Seefelder, states that "the construction of the vitreous body has entered into a new phase on account of the determination of a connection between ectodermal fibers and mesodermal cells. It has been proved particularly that the epithelial fibers of the vitreous combine

directly with the vessel endothelial cells so that a continuous strand of protoplasm is found between Müller's cells in the retina and the endothelial protoplasm." He further says that the question is not so much as to what extent the vitreous is formed by the lens or retina or by both, as it is to what extent the mesodermal tissue participates in the structure. Bach, therefore, accepts without question an ecto-

2. The basal cells or cones of the primordial lens.

DISCUSSION OF HISTOLOGIC FINDINGS OF THIS CASE.

It has been stated above that three varieties of vitreous fibers, distinguished according to their position and morphology, were found. In what way do they conform to the types as advanced in the theories reviewed above?

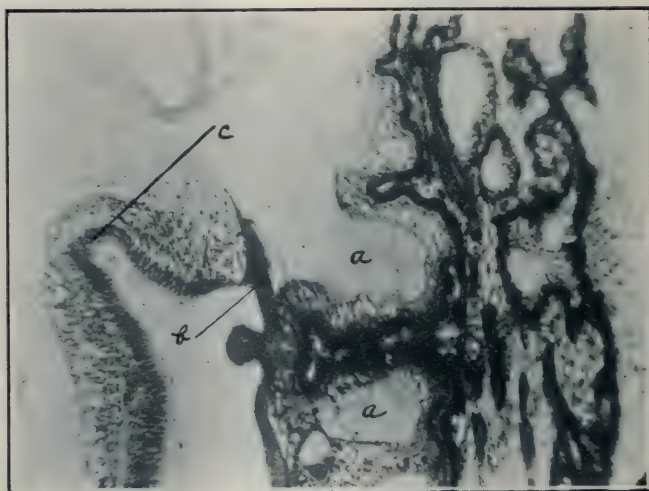


Fig. 5.—a. Primitive vitreous fibres. b. Rudimentary retina. c. Lange's fold of the retina. (x 150.)

dermal origin, but only intimates the possibility of a mesodermal origin as well.

The theories reviewed above include:

- I. A mesodermal origin from
 1. Embryonic connective tissue entering the globe thru the fetal cleft.
 2. Embryonic connective tissue entering the globe over the lip of the secondary optic vesicle.
 3. Cells entering with and proliferating from the hyaloid vascular system.
- II. An ectodermal origin from
 1. The retina
 - a. The innermost cells of the whole embryonic retina.
 - b. The innermost cells of the pars ciliaris retinae only.
 - c. Proliferation of Müller's cells or neuroglia tissue.

1. The first variety consists of the protoplasmic connecting fibrillae found between folds of transitional retina in the region of the ora serrata. These indicate what probably did take place thruout the course of the whole retina in its early embryologic state, before a differentiation of the cells into special layers has occurred and before the retinal cells are finally closed off from the vitreous chamber by a cuticulum, the internal limiting membrane of the retina. In very early embryos exactly the same form of protoplasmic fibrillae are seen coming from the basal cells of the primordial lens, before there is any evidence of a cuticulum which later becomes the lens capsule.

Inasmuch as the differentiation of retinal cells and the retinal cuticular formation begins posteriorly and gradually extends forward towards the ora serrata as the eyeball grows, it would

be natural to expect any remnant of early vitreous to be found where transitional retina still existed. Inasmuch as this early vitreous is seen only in connection with undifferentiated or embryonic retinal or lenticular cells, it must be concluded that it has only a comparatively brief existence. The object of its existence seems concretely stated in a term given by von Szily, viz., embryonal supporting tissue. This

case the third variety so dominates the space that their course is restricted to a very narrow area at the periphery, where they lie close against or parallel to the internal limiting membrane of the retina. They cannot be considered as a proliferation of Müller's cells because the embryonic condition of that area of the inner layer of the optic cup does not warrant such a differentiation. In fact the term "neuroglia

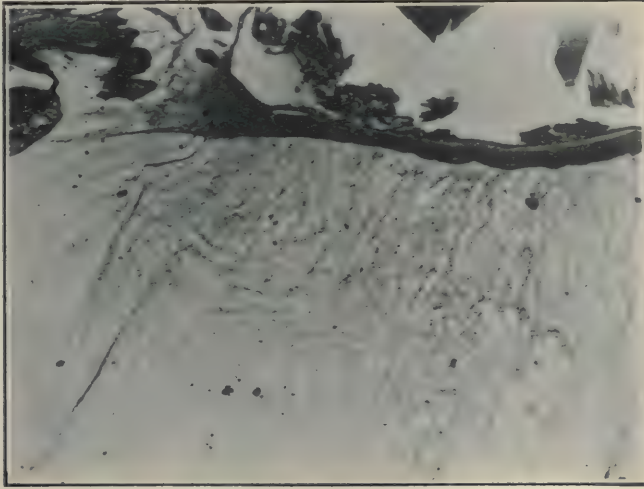


Fig. 6.—Large vitreous fibres coming from the fibrovascular sheath of the lens. (x 30.)

term implies constructive aid to the proper formation and growth of the eyeball.

It could also imply its use as a support or framework for the hyaloid vascular system which begins during the seventh week of fetal life. This system however quickly outgrows its supports which having fulfilled their chief function disappear. The first variety of vitreous fibers therefore is that mass of typical protoplasmic connecting processes from the nuclear-free or marginal zone of the inner layer of the secondary optic vesicle, and as such conforms to the theory of an ectodermal origin from the innermost cells of the whole embryonic retina. Their existence then is only transitory.

2. The second variety consists of fibers originating from the pars ciliaris retinae. Normally these fibers radiate thruout the whole chamber, but in this

vitreous" as used by Magitot and Mawas certainly is to be questioned, because the formation of a cuticulum which is called the internal limiting membrane of the retina has begun before we can definitely differentiate Müller's cells. The second variety therefore does not warrant any other ectodermal origin than from the cells of the pars ciliaris retinae.

3. The third variety of fiber, which is the predominating type, comprises that mass of fibers which certainly appears to come from no other source than from the cells of the fibro-vascular sheath of the lens. This sheath is definitely to be considered as a connective tissue structure because of its positive staining reaction by Van Gieson's method. Also because of the presence thruout the sheath of numerous elastic tissue fibers. That this variety of vitreous fibers is not merely a cuticular

product is shown by the fact that a number of fibers themselves are nucleated and morphologically are greatly elongated spindle cells. The normal eye presents nothing comparable in its embryologic history to the coarseness of these fibers. Their existence indicates very clearly a participation on the part of the normal hyaloid vascular system in the formation of a vitreous structure.

It differs from the normal eye in that the growth of the definitive vitreous fibers from the pars ciliaris retinae has largely been inhibited; because of the markedly normal increase, both in size and probably in number, of the connective tissue or mesodermal vitreous fibers which, *pari passu* with the persistence of the hyaloid vascular system and the proliferation of its connective tissue element, continued their non-arrested development. That these fibers originate entirely from a structure which is known in normal cases completely to disappear between the eighth and ninth month of fetal life is evidence that their existence also must be

transitory. The third variety of vitreous fibers therefore represent a mesodermal origin from the hyaloid vascular system.

This case, therefore, supports the theory of the mixed origin of the vitreous. It presents two forms of ectodermal vitreous, both from retinal cells. It most vividly demonstrates a connective tissue or mesodermal vitreous, about which there has been so much dispute for several decades.

Based upon the findings of this case and the histology of the normal embryo, I suggest the following chronologic and genetic classification of the vitreous of the human eye:

1. A transitory ectodermal vitreous, originating from the innermost cells of the primitive retina, and from the basal cones of the primordial lens.

2. A transitory mesodermal vitreous originating from the connective tissue cells that enter with, or proliferate from the hyaloid vascular system.

3. A definitive or permanent ectodermal vitreous, originating from the cells of the pars ciliaris retinae.

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ARE THE OBJECTIVE FINDINGS IN REFRACTION WORK THE MOST ACCEPTABLE TO THE PATIENT?

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This paper reviews the factors which limit adherence to the prescription of correcting lenses indicated by objective tests.

None of us will deny that the objective test is the best method we have at our disposal for the correction of refractive errors, yet it does not agree with the subjective test in a large majority of cases. It does, however, diagnose the existing error and is an excellent guide for further examination.

It is a matter of personal preference just what instruments we use in doing retinoscopic work—whether we use a large or a small mirror, a gas or electric light. In the Infirmary I was taught to use the gas light, which gave a soft and diffuse light; but in later years I have used a special electric bulb with frosted globe under a hood fitted with diaphragms. This light gives a more distinct reflection and possibly one is better able to detect minute errors. To me the small mirror is more satisfactory than the large one, for the diameter of the reflection is not so large. Only a small portion of the reflection enters the pupil while the total reflection at one meter distance is about twice the diameter of the mirror.

The acuteness of observation of the movements of the retinal reflection and the neutralization of the same are all important, for if one is not extremely careful the rapid movement in slight errors may be overlooked, or even mistaken for a reversal. With such cases I have learned to make a very slow movement of the mirror and have gotten results. A high error can be more easily detected because of the slow movement of the reflection until we reach a point of neutralization to within 0.25 D., then extreme care must be exercised. With high plus errors it has been my practice to place weak

lenses in the frame at first, and creep up, rather than to place a strong lens at first which is more or less confusing.

In all cases of astigmatism the movement is greater in one meridian than the opposite; and when the difference is slight, or the axis irregular I place a weak minus lens in the trial frame to emphasize the movement and to approximate the axis. This practice has been satisfactory to me in numerous instances and I have not failed to determine, within a few degrees, the axis accepted by the subjective test.

I think we should not be dictated to as to just what cycloplegic we should use. Every ophthalmologist has his preference. In the last thirty years I have used them all, but prefer, as a rule, homatropin and cocain combined, tho with young children and very doubtful cases I prefer atropin. The former, however, is satisfactory if sufficient time is allowed for it to act.

For the past few years it has been my habit to determine the retinoscopic findings, first without, then with a cycloplegic. I then had a working basis to depend upon, and at the postcycloplegic subjective examination, I found the more comfortable and acceptable lens, or combination of lenses, were those more in keeping with the non-cycloplegic objective findings. For this reason I have been using a cycloplegic only in excepted cases beyond a certain age.

In known cases of weak plus error under a cycloplegic, especially when reflex symptoms persist, I have found it better practice to apply the lenses required as soon as possible, without the use of a miotic; and allow the

muscle to gradually relax under the influence of the lenses. I seldom use a miotic following cycloplegia except above certain ages; and in all suspected cases I never use a cycloplegic or even a mydriatic. With thousands of cases, I have never gotten an evil result, besides, the strained ciliary muscle has more time to rest. Without a cycloplegic or mydriatic, light thrown upon the retina at first produces a reflex contraction of the sphincter pupillae, and this effect is also produced by accommodation. But by persisting in the examination and allowing plenty of time, the pupil is seen to gradually dilate; probably due to a partial exhaustion of the reflex function. Under these conditions fairly true correction can be attained objectively, with cases in which cycloplegia is contraindicated.

In all hyperopes there is a corresponding degree of development of the ciliary muscle; and in all true myopes there is a corresponding degree of atrophy of the same muscle. In the first instance are we apt to underestimate the error and in the second instance we are liable to overestimate the error, without a working knowledge of the total error previous to a final examination.

In very many cases we cannot deduct one diopter from the total error in hyperopia, nor add one diopter to the total error in myopia—as is the rule; however careful the examination, and exact the distance of one meter from the patient may be; for the patient will not always accept these exact deductions or additions, and modifications are often required.

On the other hand I have had patients accept the exact total error determined with the retinoscope, even when the vision previous to cycloplegia was normal in each eye. For example, a woman 39 years old had vision, right and left, 6/6. Under cycloplegia, the vision was 6/10. The retinoscopic examination showed in the right eye horizontally, no movement; vertically, + 1.00 D.; in the left eye, horizontally, + 0.25 D.; vertically, + 0.75 D. She

accepted, right eye, + 1.00 D. cyl. ax. 90°; left eye, + 0.25 D. S. \ominus + 0.50 D. cyl. ax. 90°. She wore these lenses with comfort until presbyopia approached.

Had I followed the rule she would have required right eye, -1.00 D. c. ax. 180°; left eye, -0.25 D. sp. -0.50 D. c. ax. 180°. It is needless to say that had I followed the rule the result would have been disastrous. Thirty-nine years is rather an unusual age at which I control the ciliary, but as this patient had neurotic symptoms combined with headache, and as astigmatism was evident and the vision normal with each eye, I concluded to use homatropin. The antecycloplegic and the cycloplegic findings were the same.

I have had other cases much younger, whose manifest and total error were the same. Several patients in this class had less than 6/10 vision in each eye, yet they were able to read fine print at ten inches.

It is not my purpose to discourage the application of the rule for the correction of errors of refraction, for very many cases of hyperopia will accept no other lenses than those that conform to the retinoscopic findings, less one diopter. The following is an example: A man 54 years of age with vision in each eye but 3/60. The reflection movements were neutralized in each eye: vertically, +4.50 D.; horizontally, +5.00 D. He accepted +3.50 \ominus +0.50 cyl. ax. 180° in each eye which produced vision of 6/6. It has been my experience that the higher the error, the more often is this the case.

The lower errors are the most trying and patients less often accept the objective requirements; however, the astigmatic correction is accepted in full. Frequently when the movement is neutralized below one diopter, a plus lens is accepted.

It is these lower errors which cause so much reflex disturbance of the nervous system, headache, etc. They usually have normal vision, or even much better, without a lens; and the ciliary

muscle is constantly active. Some of our internists tell us we must "fit the nervous system" even at the expense of falling short of normal visual acuity. We all recognize the fact that the eye is a part of the nervous system and that the visual impression is recorded in the brain as it is received on the retina. Why then should we make a patient uncomfortable from the lack of normal vision, and thereby cause a greater call upon his reserve forces by effort to overcome the influence of a lens, when such effort can be avoided? We must not forget that many reflex nervous symptoms are due to other causes than uncorrected refractive errors—causes that may have been overlooked by the internist.

It has always been my purpose to correct the patient's vision to 6/6 or the normal point, if possible; and not infrequently the patient will have, under correction, 6/5 or even 6/4. I myself, at 62 years of age, have 6/5+ with a high, corrected mixed astigmatism. A weak plus added cuts my vision to below the normal point.

As a rule, our patients are intelligent people and know when the letters are clear and distinct. It is most aggravating, when on the application of a plus or minus lens, a patient says he does not know whether he sees better or not. Such persons have little or no decision with regard to the affairs of life in general. I have learned to know them after a few minutes' conversation. There is always an element of doubt in their minds, as to results, even before the examination has begun. They are often chronic neurotics. They have consulted all sorts of specialists in all departments of medicine, but have failed the Christian Scientist.

When the practice of medicine becomes a fixed science, such as chemistry and mathematics, then we can follow fixed rules, but not till then. The ciliary muscle and the accommodation reflex, together with a stable and well balanced mental and nervous system, are factors to be considered in good

refraction work; just as much as functional and pathologic factors. With such otherwise normal persons we have to allow for some action of the accommodation, according to the degree of its development. If a man is sick, however (aside from the need of glasses), his ailment should first be diagnosed and treated; for unless he is well he is in no condition to meet the physical requirements for vision.

Those of us who have had experience in general medicine would easily recognize a sick man. I have had two cases of so-called walking typhoid, who came to me for glasses for relief from headache; and I have referred back to physicians numerous cases of Bright's disease, tabes dorsalis, syphilis, and other diseases which required their services rather than mine.

Accommodation is influenced by menstruation, indigestion, constipation, etc., also by localized diseases of the throat, teeth, nose and sinuses. I not infrequently tell a patient to see his physician, and wait until he is well; then to come in for an examination of the eyes. Many of them whom I did not see for several months told me that after they got well, their vision gave them no further trouble.

Of course refractive errors do cause many reflex functional troubles, but they do not cause local or general disease nor toxic absorption. The best advice one of our internists has given us as ophthalmologists is, "not to think too much in terms of glasses," but rather to study the individual case as a whole. I think all intelligent ophthalmologists are doing this, and I believe that the dogmatic assertions of the extremist are fast dying out and becoming a thing of the past. Our minds should be as broad as our subject, for even the best of specialists in any department of medicine is liable to err.

The best vision obtained under certain conditions is unmistakable, but under toxic influences on the macular

fibers it is unsatisfactory, for it is often not two days alike. The etiology of such a case is often more trying than the refraction.

I am apparently drifting away from my subject, but the conditions mentioned are recognized factors, influ-

encing the subjective refraction from that of the objective.

There are two chief factors concerned in good refraction work: The physician who knows well his subject, and an intelligent patient who knows when his vision is at its best.

NOTES, CASES AND INSTRUMENTS

SELF INFLICTED CONJUNCTIVITIS.

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BRUSSELS, BELGIUM.

Translated from the French by Dr. M. W. Fredrick, San Francisco.

Among the new ocular diseases, which the army oculists have had brought to their attention during the late war, self inflicted conjunctivitis deserves mention. Altho simulation and automutilation are not very frequent amongst the Belgian troops, and especially amongst those at the front, I have had occasion to see a number of cases of self inflicted conjunctivitis. Much more frequently seen among the troops at the rear, this form of conjunctivitis presents special clinical symptoms which form a definite picture, and make it easy of detection.

CLINICAL FORMS.

The disease presents itself under two forms: an acute and a chronic form. These symptoms are common to both forms:

Self inflicted conjunctivitis is always monolateral, the right eye being the one usually affected, and the disease is confined to the lower cul-de-sac. The cause alleged by the patient is always traumatism, such as caving in of a trench, sand thrown in the eye, lacrimatory gas, or burn with Yperite (mustard gas).

THE ACUTE FORMS. Edema of the lower lid, sometimes edema of the upper lid also. Marked hyperemia and edema of the inferior palpebral conjunctiva, of the lower fornix, and of the inferior segment of the bulbar conjunctiva. Sometimes small conjunctival hemorrhages are seen, similar to those seen in the acute conjunctivitis caused by Weeks' bacillus. The superior palpebral conjunctiva, the conjunctiva of the upper fornix, and the upper bulbar conjunctiva, are rarely involved, and stand out in contrast to the lower parts by the absence of lesions. The cornea is rarely affected, altho

chemosis is frequent. Tearing and photophobia are always present, combined with exaggerated blepharospasm. There is neither secretion from the conjunctival sac nor agglutination of the lids. This form of provoked conjunctivitis is seen mostly at the front.

THE CHRONIC FORM: Tearing is profuse, and there is almost always conjunctival secretion, with absence of microbial elements. The lower palpebral conjunctiva is thickened, and has a characteristic color, that of washed meat, or salmon-pink, and shows at times a papillary hypertrophy suggesting the granulations of trachoma. The ciliary margins are erythematous and often eczematous. This form is found only among the troops at the rear. The chronic form may show exacerbations with the symptoms of the acute form; due to the introduction of a fresh dose of the provoking agent into the conjunctival sac. During my stay in a hospital at the rear it was a regular occurrence to see exacerbations of this conjunctivitis on the days set for going into action.

The agent used for provoking the conjunctivitis is chiefly powdered *ipe-cac* which is found in abundance in all the dressing stations, where it is used to counteract the effects of the asphyxiating gases. It was the French, and especially the Colonial soldiers who taught our soldiers this easy and safe way of being evacuated. Tobacco, dental tartar, pepper, mortar, soap, benzo-naphthol, gasoline, and urine, are less frequently used. Among the French troops castor oil beans was a favorite, but I have never had occasion to see the lesions produced by this agent.

The soldier with self inflicted conjunctivitis generally has the provoking agent on his person, either in his coin pocket, in the secret pocket of his wallet, or in the case of his watch. As soon as this is discovered his trouble ceases with characteristic rapidity.

TREATMENT: *Sublata causa tollitur effectus.* The acute cases get well in a few days under an occlusive bandage fastened with collodion; the improvement in the first twenty-four hours is marked. In the chronic cases the cure takes longer; to the hermetically sealed occlusive bandage daily applications of yellow oxid of mercury ointment are added. A recurrence during treatment is always due to a leak in the occlusive bandage.

UNUSUAL BENIGN EPITHELIAL TUMOR OF LID

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OMAHA, NEBRASKA.

The following case, of no special clinical interest, is reported merely for the interest of those curious in things pathologic.

W., a man of 21, appeared on account of a lump on his upper lid which had existed for several years and had been increasing in size slowly. There was no history of trauma, nor of any similar growths. The patient showed a tumor 8 mm. in diameter beneath the skin of the right upper lid. No other anomalies of the eye were noted, nor any other tumors on the body. It was considered probably a fibroma, and as the patient was bothered by its appearance, it was removed under local anesthesia by Dr. R. C. Person, who was then assisting Dr. Harold Gifford. A small piece of skin over it was excised and the little tumor enucleated. In a week the patient was discharged. The wound healed by first intention. The patient was not seen again.

Pathologic Report.—The tumor was fairly hard, and no areas of softening or caseation were seen on gross section. Microscopic examination (see fig. 1) showed the growth to be made up of 8 to 10 lobules of very faintly staining material, separated by fibrous trabeculae. No connection with the overlying epidermis was made out in the sections, and a fibrous capsule surrounded it completely. The fibrous trabeculae and capsule stained like nor-

mal connective tissue, and showed very few vessels. The lobules stained very faintly blue with hematoxylin and eosin, yellow to orange with picrofuchsin. In them the faint outlines of epithelial cells could be made out, though the nuclei did not stain. In several lobules structures were observed almost identical with the "Epithelial pearls" seen in epitheliomata.

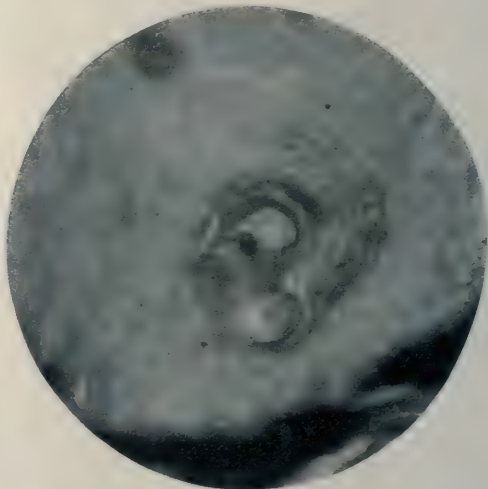


Fig. 1.—Section of tumor of lid showing epithelial mass in center of lobule surrounded by connective tissue. (Gifford.)

(See fig. 1). A few places stained deeper blue with hematoxylin, showing a deposit of lime salts. Dr. Eggers, pathologist of the University of Nebraska Medical College, kindly examined the sections and agreed as to the epithelial character of the original growth. He called it a benign epithelial tumor which had undergone hyalin change.

As to its origin, the cells stained too faintly for it to be determined whether they were from the Meibomian glands or from the surface epithelium. There was no lumen in the lobules, which would have suggested a degenerated dermoid cyst. It seemed most probably a down-growth from the basal cell layer of the epithelium which had been enclosed early in dense connective tissue and cut off from blood supply so that its cells had undergone the peculiar hyalin change observed. Pos-

sibly some epithelial growths are prevented from becoming malignant by some such process. Tho benign tumors of the lid, fibromata and dermoids, are not uncommon, I have not encountered descriptions of similar hyalin degeneration of an epithelial growth among them.

A MODIFIED EYE SPECULUM, SUPPORTED FROM THE BONY FRAMEWORK ABOUT THE ORBIT

JAMES H. McKELLAR

LOS ANGELES, CALIF.

Unquestionably, the chief element of uncertainty as to the result of an operation for cataract extraction, supposing that the operation is done by a surgeon of skill and experience, depends under ordinary conditions upon the behavior of the patient during the operation; and this is a factor in the case that is largely outside of the control of the operator. All qualified to pass on the question will agree, that the one act which the misbehaving patient may do, that more than any other will jeopardize the success of the operative procedure, is the sudden spasmodic contraction of the orbicularis palpebrarum muscle. This increases the intraocular pressure, and, if the section has been made in the eyeball, results in the escape of vitreous with its frequently dire results.

As is well known, when the ordinary type of spring speculum is used, more pressure is exerted upon the eye, if squeezing occurs, than when the speculum is not in place. Even when the patient is not squeezing, the mere presence between and under the lids of the regular spring speculum increases the intraocular tension, as may be easily determined by experiment.

The problem, then, in regard to the management of the lids during an operation in which the globe must be incised is: how to keep the lids separated and, at the same time, prevent the lids from exerting pressure upon the eyeball. The use of the standard spring

speculum fulfills the first requirement, but obviously ignores the second proposition of the problem. It seems to me that, in the event of serious loss of vitreous during an operation due to spasmodic contraction of the lids, when the lids might have been supported but

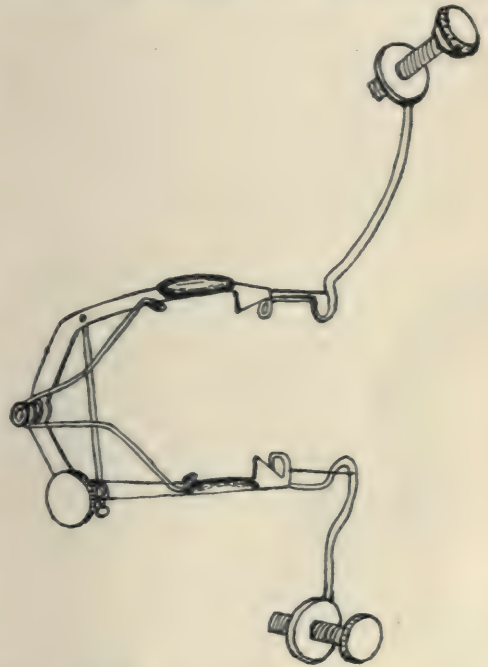


Fig. 1.—Modified eye speculum to secure support on the bony framework of the orbit. (McKellar.)

were not, the surgeon cannot hold himself entirely blameless.

Perhaps the first method that suggests itself as fulfilling both indications of the problem is the separation of the lids by the fingers of an assistant. This plan, while generally effective, is open to the objection that the hands of the assistant are very much in the way of the operator, that considerable skill and practice are necessary in the assistant, and that a sudden squeeze on the part of the patient may result in the fingers slipping.

Various retractors have been devised, one for the upper and one for the lower lid, each to be held in the hand of an assistant. Of this type are the Fisher lid hooks.

These instruments are undoubtedly

of much value in the hands of a skilled assistant, but a considerable degree of skill is required. Also, the extra assistant is unavoidably somewhat in the way, and transferring the retractors from the hands of the assistant to those of the operator, if this be done, must be somewhat awkward, except possibly in the case of men who are long used to working together.

The Green² instrument has the advantage that it is supported by the hand of an assistant, and is practically away from the field of operation. It is a valuable instrument, but it is subject to the other disadvantages enumerated in regard to the retractors.

Ewing³ in 1915 reviewed comprehensively the history of eye specula and illustrated over one hundred types.

In considering this problem, the possibility of using the bony framework of the face as support for the speculum occurred to me. I was not able to find a speculum of this kind described in the literature. Writing to the principal surgical instrument house of this country, inquiring for such an instrument, the only one submitted to me was the Brownfield speculum. This instrument has a base that is designed apparently to rest upon the margin of the orbit, the speculum itself being supported from near the outer angle of the base. This instrument did not prove useful in my hands, as I could not prevent the upper point of support from slipping under the margin of the orbit. I consider the principle of the construction of this instrument good, but it has mechanical disadvantages.

I have devised a modification of the standard spring speculum that I have found exceedingly useful in operations in which it is necessary to open the eyeball. Before using it in operative work I made repeated experiments with it, regarding intraocular tension, using the Schiötz tonometer: (1) without speculum in place, (2) with speculum in place, and adjusted, (3) with speculum in place and adjusted, and

patient contracting the orbicularis. The intraocular tension was not raised in the least either by the presence of the speculum between the lids or by the patient's squeezing.

The instrument is very simple in construction and principle. Using a spring speculum of the type in general use (Weeks), I had a leg of German silver wire soldered to the nasal end of each blade. The lower leg is one inch long and almost at right angles to the blade, flaring slightly forward and outward. The upper leg is about one and one-half inches long; passing up and inward from the upper blade and flaring more decidedly forward. At the extremity of each leg is an adjustable screw. A pair of these instruments are necessary, one for the right and one for the left eye. The speculum with screws short is inserted in the regular way. The lids are opened to the desired extent and the blades are fixed, as in the use of the unmodified speculum. Then the screws at the ends of the legs are adjusted so that the speculum is slightly raised and no longer rests upon the eyeball. The upper screw now rests upon the skin covering the frontal bone above the superciliary ridge near the median line. The lower screw rests upon the superior maxilla below the infraorbital foramen. The speculum is now supported entirely from the bony framework, the points of support being the two adjustable screws and the outer end of the instrument, which rests upon the outer margin of the orbit. A small gauze pad between the outer end of the speculum and the outer rim of the orbit sometimes is an aid in adjustment. When the instrument is to be removed it is supported by one hand, while the screws are shortened by the other. The speculum is then taken from between the lids in the usual way.

I submit the description of this instrument, hoping that it will receive consideration and prove as useful to other operators as it is proving to me.

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1. Fisher. *Trans. Ophth. Sec. A. M. A.*, 1918.
2. Green. *Ophth. Rec.* Feb. 1915.
3. Ewing. *Amer. Jour. Ophth.*, Feb. 1916.

PULSATING EXOPHTHALMOS

HENRY M. THOMPSON, M.D., AND

JOHN W. THOMPSON, M.D.

PUEBLO, COLORADO

We showed this case before the Pueblo Clinical and Pathological Society on April 14th. Notwithstanding that there are over three hundred cases on record, we deem the condition of sufficient rarity to merit mention. This formerly rare lesion may be seen more frequently with the great increase in the use of the automobile, and the many accidents which occur daily throughout the country.

Mrs. T. H. S., age 32, came to our office April 12, 1920. On September 12, 1919, she was in a motor accident. The right side of her head was struck; also she sustained minor injuries to the right hand and left foot. She was unconscious for a short time only, after the accident. There was absence of any bleeding from the nose, throat or ears. Recovery seemed to be complete, with the exception of annoying, loud roaring in the right ear.

On December 25th she first noticed that her right eye was more prominent than the left, but this condition was apparently intermittent. On April 8th, four days before presenting herself, roaring in the right ear practically ceased, and she experienced a sharp pain around the right eye, the exophthalmos becoming more marked. Since that time there has been a complete absence of pain. Diplopia was experienced at times.

Examination revealed a marked protrusion of the right globe. The vessels of the upper lid and conjunctiva were greatly enlarged and tortuous, and the chemosed lower conjunctiva protruded between the lids. The cornea was clear, the anterior chamber of normal depth, pupil oval, somewhat dilated, reacted to light. Tension was normal. Ocular movements were limited, with complete absence of abduction. No diplopia was made out.

The fundus was seen thru clear media. The disc was oval, edematous, reddened and the margins but faintly

discernible. The arteries were small, the veins very full and tortuous. We were unable to detect any impulse on palpation apparently because of tremor of the lids. A loud systolic bruit was heard when a stethoscope was placed over the right upper lid, disappearing on compression of the right common carotid. Nervous symptoms were negative.

Vision= R., 20/70; L., 20/30.

The case is of unusual interest because of the time which elapsed between the accident and the appearance of the proptosis. Inasmuch as the patient has refused any radical operative procedure, we are treating her with rest and intermittent compression of the common carotid. It is interesting to note that in fracture of the base, the prognosis is more unfavorable than in pulsating exophthalmos resulting from other causes.

**RETINITIS DISCIFORMIS
(MACULAR HOLE)**

BY AARON BRAV, M.D.

PHILADELPHIA, PA.

The purpose of this paper is an appeal to ophthalmic clinicians to adopt a uniform term for a condition in the macular region that has been described in different ways by different men. A case such as I report below is not seen often. I have seen only one case in my 20 years of hospital and private experience. I have seen similar lesions described in literature as "macular hole," "macular degenerations," etc. I feel that these conditions are due to some inflammatory process of obscure origin in the retina and should be described by the term that will indicate the pathology thereof.

The term "retinitis disciformis" at once tells us that there is an inflammatory process in the retina, causing a disc-like area of retinal destruction. The term "hole in the retina" is unscientific. It was employed probably to indicate its traumatic origin. We know now that trauma is not its direct cause. The condition is usually unilateral, but may occasionally be bilat-

eral (as in the case reported by Chance, Symmetrical Macular Degeneration, A. J. O., v. 3, p. 241).

So far as I know, the term retinitis disciformis has not been used in describing retinal diseases, and the term is not found in the American Encyclopedia of Ophthalmology. We are all familiar with the term "keratitis disciformis," describing a definite inflammatory process of the cornea, and I believe that the term retinitis disciformis is the proper term for the clinical condition described below.

H. N., boy, age 9, consulted me Jan. 10 on account of low visual acuity in the right eye. The boy was sent home from school on account of defective vision. Examination reveals nothing abnormal externally, except some insufficiency of the right internal rectus muscle. Under mydriatic we find clear media, disc oval, somewhat hyperemic, edges well defined. In the macular region we find a disclike area having the appearance of a red cherry. This area is sharply circumscribed, its edges well defined, but not pigmented. The surface of this area is red and somewhat granular. In the center of it is a minute whitish streak. The surface of this area is below the level of the retina and surrounding it in a cir-

cular formation are several small yellowish spots forming a ring, reminding one of a retinitis circinata. The veins in the temporal region of the retina are full and somewhat tortuous, while the nasal side is practically normal.

Vision in this eye is reduced to 5/60 not improved by glasses. Error of refraction as measured by the retinoscope is +2.00 Sph. \ominus +2.00 cyl. axis 60°. The boy has a good family history. Wassermann test negative. Urine negative. Mother is very nearsighted, father is farsighted, two other children wear glasses. (I did not see them.) One little sister, age 4, has a very high degree of myopia, measuring 15 diopters. I have never seen such high myopia in a child so young. There seems to be some family tendency to ocular changes. The boy's left eye is normal. There is no history of traumatism. There is no doubt that we are dealing here with an obscure inflammatory process of the retina involving chiefly the macular region. The term retinitis disciformis has occurred to me as the most rational, and I think it is applicable to similar conditions involving the macular area. I report this case, hoping similar cases may be reported under this new name.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM

London, April 29-30, and May 1, 1920

MR. JOHN B. STORY, P.R.S.C.I.,
President.

Training in Ophthalmology.

THE PRESIDENT, in his introductory address, said that two questions had aroused much interest in the ophthalmologic world during the past twelve months. The first was the establishment of a higher diploma, to distinguish the ophthalmologic specialist

from the practitioner who had no special knowledge, and had had no expert training in the subject. The second was the teaching and examination of medical students in ophthalmology before admission to the Medical Register. On both these matters valuable reports had been published by the Council of British Ophthalmologists. It was this second heading which occupied his attention in this address.

A certain knowledge, both theoretic and practical, of ophthalmology ought to be possessed by every person admitted to the Register. There were

two reasons for this: the vast majority of practitioners were certain to have to diagnose and treat diseases and injuries of the eyes, in certain circumstances when the aid of the specialist could not be promptly obtained, if at all. The second reason was, that in many serious constitutional disorders the evidence afforded by ocular conditions was most important, and often they were the symptoms which induced the sufferer to seek medical advice. Interstitial keratitis was often the first evidence of infantile syphilis, even before the classical teeth of Jonathan Hutchinson had erupted. Ocular tuberculosis might be the first manifestation of that disease, and acquired syphilis might make its appearance in the iris or choroid or retina, long after the patient had quite forgotten having had the original disease. Ocular signs were important in tabes, disseminated sclerosis, meningitis of all varieties, brain tumors, nephritis, diabetes and arteriosclerosis among the common maladies. Every qualified person should have some knowledge of glaucoma, and of the effects of atropin in aged eyes.

Last year, the Council of British Ophthalmologists brought the question of ophthalmologic teaching before the General Medical Council, recommending that compulsory attendance at an ophthalmic hospital should be required of all students, and that there should be an examination by ophthalmic surgeons. The reply to that was a recommendation for ophthalmic hospital attendance, but a special examination was thought to be unnecessary. The action of the General Medical Council was regarded with astonishment in Ireland, where, for thirty years, every medical student had given three months' compulsory attendance at an ophthalmic hospital; and had to undergo an examination by two or more ophthalmic surgeons; and the results had been most beneficial to the young doctors, and perhaps still more so to their patients. The object was not to turn out half-educated specialists, but to prevent men being let loose on the public who saw no difference

between a leucoma corneae and a cataract, and who mistook obvious iritis for equally obvious conjunctivitis.

It was held by many that the curriculum would be overloaded if ophthalmology was given this position in medical education. The reply, which was unanswerable, was that no such overloading had been caused in Ireland. There should be no specialty of which the registered practitioner should be quite ignorant. An examination, to be of use, must be a practical and clinical test: a paper examination he considered to be quite useless. Mr. Story related some of his examiner-ship experiences and, in conclusion, said he feared that the pressure of the Society would have but little effect on the Mandarins of the General Medical Council. But he had great hopes that the weight of the great mass of the profession, who were not specialists, would succeed in getting these necessary reforms carried out.

Enlarged Corneae in Goldfish.

MR. C. H. USHER read a paper on this subject which was called forth by the record of a case of enlarged corneae by Mr. Treacher Collins. In the fish examined the corneae seemed to be of uniform thickness. Enlargement of eyeball had been found in a number of different kinds of fish; these died if left alone, but the condition could be cured by careful attention to the water and food. The gas-bubble disease of fish kept in aquaria was attributed to diminution of pressure. The goldfish examined lived in three small ponds connected by short pipes to allow both water and fish to pass from one to the others. The source of the water was a spring which had been condemned years before for drinking purposes, as it was held to be contaminated with sewage. Hofer repeatedly saw opacity and perforation of the cornea in trout which lived in water containing iron. Burge produced corneal opacities and cataract in eyes of goldfish by ultra-violet rays when the fish were living in certain solutions, but failed to get the same results when they were living in tap water which contained very

small quantities of those salts. Gaylord found that artificially reared trout confined in tanks one above the other on a single water supply showed an increasing proportion of thyroid hyperplasias from the highest to the lowest tanks in the series. Adding to the tanks pure water, iodine, mercuric chlorid or arsenic retarded or prevented the hyperplasia. Marine and Lenhart found that three chief conditions influenced the thyroid growth in fish: a limited water supply, overcrowding, and overfeeding with a highly artificial and incomplete food.●

Megalocornea and Microcornea.

MR. TREACHER COLLINS read this paper. In a case he described in 1913 as one of buphthalmos, with full vision and without cupping of the disc, it was evident that the enlargement of the cornea could not be attributed to stretching due to increased intraocular tension. This was shown by the absence of any of the signs of glaucoma, such as contraction of the field of vision and cupping of the optic disc, also by the absence of any ruptures in Descemet's membrane, or any want of definition at the sclero-corneal margin. He described a fresh case which he had recently seen in a woman who was the subject of a peculiar form of dwarfism. He attributed the condition of the cornea to some disturbance in the growth-regulating mechanism. He also showed that there was a condition of undergrowth of cornea met with in otherwise well-formed eyes.

Nonoperative Treatment of Glaucoma.

MR. JOHN ROWAN read a paper, his title being "Are not some cases of glaucoma better treated without operation; and, if so, what are the indications?" The great object, he said, was to determine the cause of the increased tension. If the general factors producing it were known, something in the way of prevention might be done. Several cases had been kept under eserine for periods of months, one for two years, keeping back further developments, and in some cases resulting in improve-

ment. If for any reasons, general or otherwise, an operation seemed inadvisable, keeping the patient under eserine and strict observation seemed best. But in the presence of signs of advancing disease, operation should be done. In the majority of cases he advised operation, especially early operation.

DISCUSSION.—Sir Anderson Critchett described glaucoma as the bugbear of the ophthalmic surgeon. Admittedly operation should be done early, but in some instances, whatever the type of operation, or however skilfully done, there was a disappointing declension of vision. Some had ceased to operate for chronic glaucoma, and he would be very glad to learn what were the indications for operating, and for abstaining from operation, respectively.

Mr. Harrison Butler's practice was to operate in chronic glaucoma when the tonometer showed the eye tension was raised and there were signs of functional failure.

Dr. G. Mackay spoke of the tendency to the formation of pigmentary adhesions between iris and lens capsule, with diminished transparency following the prolonged use of eserine or other miotic.

Dr. Rayner Batten regarded the cupping of the disc as the disease, and the glaucoma as the symptom: the cupping was progressive, whether or not the tension was relieved.

Mr. Richardson Cross said that if central vision was good, and there was great narrowing of the fields, especially towards the fixation point, and there was an absence of inflammatory symptoms, one could safely rely on miotics. No dogmatic statements could be made which were applicable to all cases.

Mr. Treacher Collins agreed that many cases of chronic glaucoma could be kept in check by the continuous use of eserine, but if the symptoms mentioned by Mr. Cross increased, he advised operation. But such factors as the age of the patient and his expectation of life, and his blood pressure must be taken into consideration. If the blood pressure were high, that was an additional danger in operating.

Mr. R. R. Cruise thought the number of cases in which the pressure had been overcome by drops must be small in comparison with those in which the results were deplorable. He spoke highly of the value of the tonometer in these cases, not only in estimating the intraocular tension, but for judging of the progress in a given case.

Dr. A. Hugh Thompson said that as the ocular tension might vary from time to time, even at different hours of the same day, alteration in the visual fields was a surer sign of the condition of a case of glaucoma than the tension.

Mr. A. Greene (Norwich) thought it was to the physician one must look for an explanation of the cause of glaucoma: he should be asked to supply a drug which would control the secretion of the ocular glands, especially the ciliary.

Mr. B. Cridland thought most ophthalmic surgeons were not in favor of simple iridectomy for chronic glaucoma, especially in cases in which the field of vision was contracted and involved the fixation point. When "operation" was spoken of, he thought it should be understood to mean decompression. In several cases he had obtained satisfactory fistulization without touching the iris.

The president said that in cases in which the tension was distinctly high and the fields were contracted, and there was a central scotoma, he advised operation. During recent years the operation he had almost exclusively done was the trephine operation.

Infection after Cataract Operation.

MR. T. HARRISON BUTLER read a paper on infection after cataract operations, in which he discussed some reasons for failure. There were two types of inflammation, having a different etiology. The first was the acute wound infection, the septic hyalitis, panophthalmitis, most probable due to infection from without, mostly by the pneumococcus, often derived from a diseased sac or an ethmoiditis. In his second group the cause was mostly an endogenous infection, or due to gen-

eral toxemia. Diabetes he regarded as a fruitful cause of failure.

Diabetes in Relation to Ocular Disease.

After an afternoon spent at the Royal London Ophthalmic Hospital inspecting and discussing clinical cases, the evening was devoted to a debate on the above subject.

Sir Archibald Garrod addressed himself chiefly to the subject of diabetic retinitis. In the diabetic form the ocular hemorrhages were apt to be guttate rather than flame-shaped, the white spots more opaque and sharply circumscribed, more scattered and less apt to group themselves around the macula. But albuminuria in diabetes did not necessarily point to serious renal damage; the amount of albumin in renal cases gave no sure clue to the gravity of the kidney lesion. Albuminuric retinitis was met with in young patients, even in children. This suggested that the occurrence of retinitis in diabetes was not to be attributed to the accumulation of sugar in the blood, nor of the accompanying aceton bodies. A contributory cause must be looked for other than the disorder of carbohydrate and protein metabolism, and if it were true that the retinitis was associated with cardio-vascular changes, this suggested an explanation. Most of the diabetic patients in his wards who had developed retinitis had evidences of renal disease also. He suggested that both diabetic and albuminuric retinitis were associated with high blood pressure and arterial changes. A line should be drawn between acute diabetic cases in early life, and the mild diabetes of middle life which might persist for many years without grave detriment to health. Cataract seemed to be the commonest eye trouble to which diabetics were specially liable. He urged the importance of diabetic patients being put thru a course of hunger treatment before an attempt was made to operate on the eyes.

Mr. Foster Moore discussed the subject in much detail, based upon careful observation of 6 cases. He said the chief ocular complications in diabetes were retinitis, cataract, retrobulbar

neuritis, retinal and vitreous hemorrhages, lipemia retinalis. Lesser conditions met with included alterations in intraocular tension, in refraction, also iritis and debility of accommodation. These he considered in detail. Retinitis had affected his older patients only: there was only one as young as 39; these usually had arteriosclerosis also, and sugar and albumin in the urine was common too. Diabetics tended to develop hemorrhages into retina or vitreous. The prognosis of retinitis in diabetics was much less grave than in renal retinitis: 60 per cent of Nettleship's cases lived beyond two years. The term "diabetic cataract" should be restricted to the cases of somewhat rapid opacity of lens seen in young diabetic subjects: it was always bilateral and of a diffuse homogeneous type. A certain number of diabetics developed defective vision, in some the cause being retrobulbar neuritis. Concerning alterations of refraction, a certain number of observers had noted a variation with the amount of sugar excreted: in most cases a decrease in the sugar output lessened the degree of the myopia.

DISCUSSION.—Dr. Cammidge spoke of observations on 350 cases of diabetes. He thought the age-incidence of cataract and retinitis which had been observed was only explicable by the chemical changes taking place in the body at the various ages. Glycosuria was not a disease: he had seen a number of young people who had persistent glycosuria which, however, was but little affected by changes in diet, and the health did not seem to suffer. Two main groups of diabetics could now be well established: the pancreatic, and the hepatic. In the latter there was an increased formation of aminoacids, of which tyrosin was one, and there was an increased fat content in the blood, progressive as the patient became worse.

Dr. C. O. Hawthorne spoke of the association of ocular palsies with glycosuria, and of the fundus changes which might occur when sugar was present in the urine. Admittedly ocular palsy was a rare event in diabetes

mellitus, therefore the glucose present in the latter could not cause the palsy. It was probably, he thought, a peripheral neuritis affecting the terminations of one or other of the ocular nerves.

Mr. R. R. James said all cases of cataract in diabetic patients in the hospital were first treated by the physician to lessen the sugar output, before any operation was attempted on the eye. If it could be avoided, he preferred not to do iridectomy.

Mr. Burdon-Cooper spoke of finding tyrosin and cholesterin in lenses which had been removed from diabetic subjects. He had not yet tested such lenses for glycogen. He believed that the acids and ferments secreted by the ciliary body in the aqueous were responsible for the hydrolytic change in the lens.

Prevention and Treatment of Ophthalmia Neonatorum.

Members paid a visit to a special hospital for the treatment of this condition, under the Metropolitan Asylum Board (St. Margaret's), and afterwards discussed the subject in the large room. The debate was opened by Dr. GIBBON FITZGIBBON (of the Rotunda Hospital, Dublin). Among 38,106 born in that institution in 23 years the incidence rate of the disease was 0.24 per cent. Practically during the whole of that time the Cr  d   prophylactic treatment was used. As soon as the child's head was born, the eyes were wiped clean of all mucus with swabs of boracic lotion, and after the child had been bathed, one or two drops of a 1% solution of silver nitrat were dropped into each eye. Often, he believed, the child was infected in passing through an unclean cavity. He expressed a strong faith in silver nitrat. He had found an efficient vaccine a strong help; the maximum dose for an infant was 3 to 5 millions.

Mr. M. S. Mayou (surgeon to the institution) entered into the subject thoro. He had found the meibomian secretion contained the Xerosis bacillus on the third day of life, and it was almost constantly present soon after birth. If the fetus passed quickly

thru the vagina, the chance of infection was much lessened. In one instance, the first child of twins was infected, the second escaped it. He uttered a strong warning against the use of silver nitrat by the inexperienced; for these, 10% protargol was safer. In the cases at this institution the gonococcus was found in 60% to 65% of cases; in the nongonorrheal, the streptococcus was the only germ of serious import. He said the question of immunity to the gonococcus needed more study than it had yet received. Patients who had had one attack of gonorrhea were not rendered by any means immune thereby against another attack. He went fully into histologic questions and the technic of treatment, setting forth the statistics of the institution. He concluded by some remarks on the training of students and midwives.

Subsequent speakers dealt with the matter in the light of their experiences at the various large cities; and the opener replied, elaborating his views for combatting venereal disease, which was at the root of this trouble.

The meeting unanimously passed a resolution urging that teaching of students and midwives on this subject should be given in the institution.

H. Dickinson.

CHICAGO OPHTHALMOLOGICAL SOCIETY

President, Dr. Alfred N. Murray.

March 15, 1920.

Some Indications for Evisceration.

Dr. G. W. Mahoney in the first few years of practice in special work, wherever he found it necessary to remove an eye, did an enucleation in nearly every case. In many cases there was considerable deformity; and in children lack of development of the side of the face from which the eye was removed. He soon gave up this as a general practice; and in panophthalmitis with a septic distended eyeball and acute pain he felt evisceration was the operation indicated, not drainage or enucleation.

In staphyloma of the cornea following serpent ulcer, with a markedly protruding cornea which the patient was unable to cover or moisten with the eyelids, there was frequently breaking down in the center giving a very unsightly and troublesome eye and evisceration was indicated. In absolute glaucoma with recurring exacerbations of inflammation and pain, he always did an evisceration. In keratoglobus he had never been forced to the extreme of removing the eyes where both were involved. Where one eye was enormously distended, the distention increasing month by month, the sclera becoming more and more thinned, pain increasing, deformity more apparent, and the sclera in danger of rupturing, he had done an evisceration.

If a patient came with a perforating wound of the eyeball involving the ciliary body, the treatment was perfectly clear. It would make no difference whether the patient had vision in the eye or not, that eye should be removed, as there was the great danger of sympathetic ophthalmia any time after ten days to two weeks from the date of the injury. In the other classes where removal of the eye was necessary, he did an evisceration. The technic for the operation was described.

The author thought there should be no hesitancy in choosing between enucleation and evisceration in children, for certainly in children, when the entire globe is removed, the side of the face from which the eye has been removed does not develop as well as the opposite side, and the deformity increases as time goes on.

Enucleation and its Substitutes from a Cosmetic Standpoint.

Dr. HARRY WOODRUFF of Joliet, Illinois, thought the patient was entitled to lose as little as possible in personal appearance when an eye was lost. The question of deformity was not always secondary. Some patients, women perhaps, look upon the loss of an eyeball as a terrible catastrophe, from the standpoint of personal appearance; and would be willing to do

almost anything to have that operation performed in such a way that no one would be able to detect the deformity.

He had in mind a woman of middle age who had sarcoma of the choroid; and naturally enucleation was urged. She delayed for quite a while because, as she expressed it, she "would rather die than suffer the deformity." She finally consented, and the eye was enucleated in the ordinary manner. Unfortunately she did have a considerable deformity. She was given as good an artificial eye as he was able to get for her in Chicago, but she had so much depression of the upper lid that she wept over her personal appearance. Using Beck's syringe, and solid paraffin, he made two injections. In the first injection the quantity was not sufficient, but after putting in enough paraffin it filled out the ball so that with the Snellen eye she had a very much improved appearance. He had treated a number of these cases since with equally good results.

Before the Snellen eye came into common use, he had experience with the Mules' operation, and also with the operation of Frost, where glass balls were introduced into Tenon's capsule. The original operation of Mules', of implantation of a glass ball into the scleral cavity, if successful, gave a beautiful result. The objection to it was the fact that the operation must be an evisceration, and the general opinion seemed to be that evisceration was not entirely free from danger of sympathetic ophthalmia, at least, not to the extent that an enucleation was. There were few oculists who would do an evisceration, unless it was a necessity because of panophthalmitis, or of injury where enucleation would be quite difficult. He thought that this general opinion was the correct one. Sympathetic ophthalmia followed evisceration more frequently, perhaps because it was not thoroly done and uveal tissue was left. But even then there was certainly an argument against evisceration. He supposed that this was the reason why Frost and Lang abandoned Mules' operation and attempted to fill out the cavity after an

enucleation by implanting a glass ball in the capsule of Tenon.

Another objection to both of these operations was the fact that the glass balls were extruded in many cases. The glass ball remained in place in some of his cases while in many it came out.

He had had experience with the implantation of fat, both from the gluteal region and from the abdomen. He attempted once to implant fat from the abdomen with the skin surface outward. The idea was to have a skin surface take the place of the cornea being sutured to the conjunctival edges, but the skin sloughed in his case and the fat also. He hardly knew whether all came out or sloughed away, but the convalescence of the patient was so delayed that it did not seem to him worth while.

He thought the proper and safe method to give the best cosmetic result was to perform enucleation, unless evisceration was necessary, suturing the muscles, capsule and conjunctiva together; and then, if one could get the cooperation of the artificial eye maker or dealer and get a good fitting eye, one could usually get a satisfactory result, except in a person who had little or no orbital fat. For unsightly sinking in of the upper lid, the method of injecting paraffin beneath the conjunctiva was used.

Plastic Corrections in Slight Ectropion to Retain Glass Eye.

Dr. E. F. Snyder said there were two things he would like to speak about. For teaching purposes, by taking a wooden ball, using a few tacks, and a little chamois or leather, it was simple to demonstrate almost any plastic operation around the eyelids. He called attention to slight ectropion, where we sometimes had a little difficulty in using a prosthesis. With plenty of plastic skin on the upper lid, if there was slight ectropion of the lower lid, as after a burn or injury, necessitating taking out the eye, and this slight burn prevented the glass eye from fitting; when the skin was brought into the lower lid the double

purpose was served of getting ample plastic material to supply the other lid, and an orbicularis muscular effect in holding up the lower lid.

By going in with a keratome at the border of the upper lid, cutting off the layers at the outer border, undermining the skin of the upper lid, making a slight circular flap, following the lines of the orbicularis, one could get all the plastic skin needed to correct the defect and hold it in place, because the natural line of cicatrization extended up, against the pressure of the ectropion which was downward.

In a case of slight burn he was able to pull up the ectropion and not have the slightest deformity; the tongue-shaped flap held the lower lid up and kept it up.

DISCUSSION.—Dr. George F. Suker could not agree with Dr. Mahoney in regard to evisceration. He would not do an evisceration under any consideration whatsoever. If an eye had to be sacrificed, enucleation should be done. The sclera, in evisceration lost a large share of its blood supply, and because of this, frequently underwent degeneration with calcification. Such a scleral cup would act as a foreign body and an irritable stump ensue, which must ultimately be removed. Such scleral cups often caused sympathetic irritation.

In 1898 de Schweinitz collected about a hundred cases of eviscerations and implantations of foreign bodies into Tenon's capsule, or scleral cup; and reported not one authentic case of sympathetic ophthalmia arising from the implantations. In quite a large number of cases sympathetic irritation had arisen from a simple evisceration, several cases of sympathetic ophthalmia had followed from Mules' operation. When one had to sacrifice an eye, sacrifice it in toto.

In the majority of enucleations the upper lid drooped because of the destruction of the sympathetic nerve supply coming from the lenticular ganglion; which was often destroyed, but ought not to be destroyed. Following the severance of the sympathetic fibers to the upper lid a sympathetic

ptosis resulted, one of the symptoms of Horner's symptom complex.

There was one foreign substance which could be retained in the orbit and not be affected by the body juices, and that was lead-free glass. Any other metal, be it gold, silver or platinum would be affected, because the human body manufactures hydrochloric acid. But it does not produce any acid that could affect lead free glass, or silicon. A hollow glass ball (18 to 23 mm. in diameter) implanted into the capsule of Tenon, and with the preservation of the lenticular ganglion, gave an ideal result; both as to fullness of socket and range of motility of shell.

The sphere was never extruded after the stitches had been removed, provided no infection had been introduced and the sphere was of the proper size. A too large sphere would cause tension on the sutures, and they might give and allow the sphere to be cast out. Should this occur, repeat the operation under local anesthesia using a smaller sphere. The implantation of fat into Tenon's capsule was a nice procedure and yielded a good result; but care must be exercised not to insert fat that had been crushed. Again, should fat necrosis occur, as it sometimes did, it caused a long delay in healing, and the end result was only a shade better than a simple enucleation.

As to paraffin, whether inserted as a sphere or injected when fluid into the prepared and sutured cavity, it would often disintegrate, disappear, or cause a paraffinoma. In implantations of any kind sufficient covering for the object implanted was an essential. The cone of the muscles should be brought over the sphere with a purse string catgut suture, and the conjunctiva sutured over this. There was no doubt then that it would be retained permanently. He had made many of these operations and up to date had not had any patients in whom the ball extruded, and some cases were operated on fully twenty years ago. He had had to take the sphere out when implanted into the scleral cup, because of an ir-

ritable stump or so-called sympathetic irritation.

Every operation about the face had two purposes: First, therapeutic, and second, cosmetic. There was no necessity for doing simple enucleations on patients, whether man or woman or child, when one could do an implantation. Sinking in of the upper lid was at a minimum with the preservation of the lenticular ganglion. After an enucleation in children, the bony orbit was not appreciably retarded in its growth. The apparent difference was due to the shrinking of the orbital contents, and this shrinking was immeasurably counteracted by an implantation of any sort. Postmortem measurements, years after the enucleation of children's eyes amply verified this statement.

He agreed with Dr. Woodruff that an evisceration might be performed when we had no other choice. The injection of paraffin some time subsequent to operation, was not a good surgical procedure, as any building up or filling out of the orbit could be done at the primary operation of enucleation.

The implantation of a glass sphere embedded in a layer of fat was the ideal implantation as it gave more of a cushion for the shell to ride on. Implant this into the muscle cone, bringing the latter together with pursestring suture and then bring the conjunctiva over this stump. As to size of the sphere to be used, usually one about $\frac{3}{4}$ to $\frac{4}{5}$ of the size of the eye enucleated was chosen—one ranging from 18-22 mm. in diameter.

The objection to the various operations of implantation was that they took considerable time for healing. However, this was no valid objection. For several years past, he had been using an ordinary tonsil snare to sever the optic nerve after the globe was freed of its muscle attachments. The hemorrhage was practically nil, and this was of advantage as the subsequent reaction, edema and infiltration, were much less. Relatively speaking, he had very little edema to contend with after implantation. If it were his misfortune to lose an eye, he would

want an enucleation with an implantation into Tenon's capsule.

Dr. William E. Gamble should dislike to see the society go on record as throwing overboard evisceration. It had been his experience that in cases where one had panophthalmitis, the other eye did not become involved. It was only in the slow, chronic uveitis cases, that one had involvement of the other eye. In cases of panophthalmitis the danger of opening up the sinus at the back of the eye, and the very little danger of sympathetic disease made it, as he saw it, good surgery to eviscerate and poor surgery to enucleate.

Dr. Michael Goldenburg said that in cases of panophthalmitis he would neither eviscerate or enucleate. Panophthalmitis was nothing more or less than an abscess of the eyeball, hence the only surgical treatment indicated in an abscess was incision and drainage. Surgeons no longer cut out or curetted an abscess cavity in any other part of the body. It would seem to him that it would be contraindicated here more so than anywhere else. The impossibility of eviscerating and removing every vestige of choroid was apparent to every one. The opening of the many channels of exit in the acute stage, e.g. the venae vorticosae, the anterior ciliary veins, etc., was always a dangerous procedure. One could not tell if infection was or was not going to follow. In enucleation the same held true, probably even more so. The danger of sympathetic ophthalmia and meningitis must be remembered. The only surgical treatment indicated, in his opinion, was wide incision of the cornea, within the limbus so as not to open the canal of Schlemm. Keep this incision open wide to obtain free drainage; and after all inflammatory symptoms have subsided, and the wound had healed, wait three or four weeks and then enucleate. Evisceration in panophthalmitis was a procedure of yesterday. He had seen such cases followed by serious results.

He hoped Dr. Woodruff had better luck than other in injecting paraffin. Very recently he had seen a case of paraffinoma of the face, following in-

jection of paraffin for a deformity of the nose. It would seem that paraffin for no particular reason at times had the perverse habit of spreading all over the face.

Dr. Harry S. Gradle believed in evisceration of the eyeball except in intraocular tumor, which was an absolute contraindication to evisceration. The results of evisceration were so far superior to the results of enucleation, cosmetically speaking, that there was no comparison.

He was not particularly anxious to eviscerate in the type of irido-cyclitis that might lead to sympathetic ophthalmia, because he was not sure of the evisceration. But the absolute removal of all of the intrascleral contents was as sure a preventive against sympathetic ophthalmia as was enucleation.

He agreed with Dr. Gamble that evisceration in panophthalmitis was preferable to enucleation, not because of danger of purulent meningitis, but because a better cosmetic result was obtained. The literature shows few cases of meningitis following enucleation. The first case was reported by von Graefe, but there was no autopsy. There had been eight autopsies of cases of meningitis occurring after enucleation, and in not one of these cases was there any continuity of the infectious process in any of the structures of the orbit. In other words, it would not have made any difference whether enucleation or evisceration had been performed, a metastatic meningitis would have occurred just the same.

For implantation he preferred fat. It was an autogenous substance that molded itself to the contour of the sclera or muscle cone. It was pliable. It was a live implant. It became readily vascularized and maintained its vitality. It must not be implanted in the presence of an acute infection, such as panophthalmitis because it would be extruded. In any other condition fat might be implanted after evisceration or enucleation.

Dr. Frank Brawley, in support of those who had advocated evisceration, called attention to the work of Dim-

ity, of New Orleans, who had done eviscerations of various sorts for twenty years. His present operation gave the best stump that had ever been obtained. (See v. 2 p. 653.)

Dr. Robert Von Der Heydt stated that three years after operation it did not make much difference whether evisceration or enucleation had been done, as the scleral tissue was practically gone after that time. Because of doing an evisceration he would not be afraid of sympathetic inflammation in the other eye. He used a large fenestrated scoop, such as the ear men use, for curetting the contents of the eye, removing all uveal tissue. He liked to see a free hemorrhage in removing the eye. It was nature's self-cleanser and had saved many a wound from infection, and could be controlled by hot bichlorid at any time.

Dr. E. F. Snyder said he had done many fat implants in the last five years, and he had good results in some cases and indifferent ones in others. The fat implant principle was very much the same as the Lane bone plating principle. If there was infection the fat was of low resistance, and easily lost. One had to do an absolutely immaculate operation and had to put the fat in with absolutely no crushing and no handling. If one got it in right, as a plastic substance, the orbit could be filled up beautifully. While some was absorbed, all of it was not. His failures in fat implants were due to low grade infections, and since following an improved technic he had had better results.

He had seen eyes in which there was, or had been, gonorrheal ophthalmia, with sloughing of the cornea, and a chronic process set up after the acute process had subsided. In such cases he had been afraid of enucleation, and had always eviscerated. He had had three such cases that he could remember, and thought evisceration was a far safer procedure, in that it did not lead to any ill results. He was afraid of opening a communication with the meninges where an acute or chronic gonorrheal infection was present.

Dr. E. V. L. Brown said that evisceration did not remove the choroideal tissue, extending along the vortex veins in their course thru the sclera, and a good many cases of sympathetic inflammation had followed evisceration. He took issue with Dr. Snyder's statement that sympathetic inflammation was not to be feared in the perforating gonorrheal ulcers of the cornea. He reported such a case in the Archives of Ophthalmology in 1906. The defect in Descemet's membrane was really small in these cases, and Fuchs contended small atria rather than large ones were found in sympathetic inflammation.

Dr. A. A. Hayden felt it was well for us to remember, even in enucleation done apparently early when no inflammatory signs were present, that occasionally a sympathetic inflammation in the opposite eye developed. This was true in a case that he saw with Dr. Gamble about nine years ago, which was presented to the society. Dr. E. V. L. Brown examined and sectioned the eye. The boy had a penetrating wound of the sclera, and on the ninth day after the injury enucleation was advised. This was done on the eleventh day with resection of one-quarter of an inch of the optic nerve. Healing was without event, but on the twelfth day, sympathetic inflammation developed in the second eye with loss of that eye. If he understood Dr. Suker correctly, he said that sympathetic inflammation did not develop after a well performed enucleation. He submitted this case, which was reported some years ago, as one in point.

Dr. Mahoney, in closing, said he could see no reason why, where there was a wide open sclerotic cup, it could not be cleaned thoroly if we took the time to do it. We then had the very best stump possible, and it was not necessary to implant anything foreign to take its place.

He recalled a case of a man who worked in the stockyards, who had sustained a frightful injury to one eye. The eye was enucleated the same afternoon, he thought about two and a

half or three hours after the injury. He saw the man some four or five years later; he was totally blind in the other eye, and had been for two or three years. He had every indication of having had sympathetic ophthalmia in the other eye. The speaker had never had a case of sympathetic ophthalmia in his practice and he had done evisceration, in the class of cases he had mentioned, for twenty-five years.

There was one other point he would like to speak about atrophy or degeneration of the sclerotic. Within the last month he had a patient come to him whose eye was removed forty-two years ago by a very well known oculist in Dublin. This man had worn a shell eye all these years, occasionally removed it at night, and the cavity kept gradually filling in with hypertrophied tissue until he could not wear an eye. He came to him to see if he could do something for him to restore the cavity so he could again wear an artificial eye. He attempted to do that; he dissected out a large amount of tissue and implanted some Thiersch grafts. When he went deep into the cavity he came upon the sclerotic; it was white and firm and of ordinary thickness and looked perfectly normal as a fresh sclerotic would today. He removed a piece for examination. While this case did not prove anything, still this man carried the sclera of the eviscerated eye for forty-two years without any change whatever. He was sure evisceration was the operation to do in the classes of cases he mentioned; as it gave the best result.

Dr. Woodruff stated that if one had ever attempted enucleation in purulent panophthalmitis with terrific swelling of the eyelids and orbital tissues, he could speak from bitter experience. He had been taught to eviscerate such an eye, and thru reading just such a discussion as we were having now he finally came to the conclusion he should enucleate and not eviscerate. So the next case that presented itself of panophthalmitis, one of these terrific cases, he enucleated the eye, and it was one of the most humiliating experiences he ever had. It was an exceed-

ingly difficult operation; he made up his mind he would perform evisceration in such cases and not attempt to enucleate, since sympathetic ophthalmia was not apt to follow a purulent process. It was not the purulent inflammation that caused disaster; it was a proliferative uveitis. These were the dangerous eyes and one would be perfectly justified in not eviscerating such eyes.

Dr. Suker was very definite and positive in his ideas as to what to do in these cases, but he had not been able in all these years to get others to take up this idea. He (Dr. Woodruff) attempted to get lead-free glass, but he did not know whether he got it or not. The glass did not stay in in many cases, altho it did in others. The idea of fat implantation was better because fat was autogenous; it was a natural tissue of the body, and fat made the eye more prominent. So that if one could place an implant of fat and have it remain, it was the most natural sort of substitute for the eye. For old cases where the atrophy of the orbital tissue was great, the injection of solid paraffin was safe and satisfactory.

Filaria Loa.

DR. WILLIAM E. GAMBLE exhibited a specimen of filaria loa, and gave an abstract of the literature on the subject.

Siderosis Bulbi.

DR. E. K. FINDLAY reported the case of a man, 39 years of age; occupation, structural iron worker. He came to the clinic March 9, 1920, on account of failure in vision of the left eye. He gave no history of injury or previous inflammation. In November, 1919, he noticed a change in the color of the left eye, and spots began to appear before the eye. Vision failed rapidly this last month, until now he had only light perception. Examination showed a pronounced yellow color of the left iris, while the right was a clear blue. The pupil reacted to light and accommodation, and when the pupil was dilated concentric brown pigment deposits could be seen on the lens, which

was entirely opaque. An x-ray plate showed a foreign body in the vitreous chamber behind the equator.

DISCUSSION.—Dr. Clark W. Hawley said: About twenty-five years ago, a man was hit over the eye with a flying bolt. He went to his work the next day after a surgeon had sewed up the wound. He had no trouble for over a year. Then the pupil dilated extensively. In the posterior portion of the eye was a white mass in which there was a small piece of steel. It had been encapsulated. He removed the piece of steel with the result of 20/20 vision.

Dr. William A. Mann reported two cases of similar character. The first case came to him for treatment of iritis, the patient having been under treatment for that condition. He found marked siderosis of the iris, and advised an X-ray, which showed a small foreign body just below the lens and apparently in front of it. Application of the magnet finally succeeded in pulling it out from below. The iris was stretched across the anterior chamber, but finally pulled loose. After a corneal section a small magnet extracted the foreign body, and the man recovered fairly good vision.

The second case was interesting because the man came to him and said, "My wife says my eyes do not look right."

There was marked siderosis and a dilated pupil. He stated that about four months before he got a piece of steel in the eye and the foreman took it out; but told him there was a piece of steel in the eye, altho he could not find the point of entrance, that down low on the iris there was a black spot. The pupil contracted under eserin, but did not show anything more. An X-ray was made and it showed a piece of steel in the same position as in the other case, below the lens at the root of the iris and in front of the lens, and it was suggested that the magnet be used. The patient was taken to the hospital, the giant magnet applied. At first there was no response, but by repeated applications of the full current it finally began to show a little bulging. Finally the steel was removed by the

magnet. There was no congestion following the operation. Vision was 20/20, and two or three weeks afterward the pupil was almost normal.

Dr. S. Luther McCreight stated that during the past four years he had seen thirteen cases of siderosis, and in only two of them would the pupil react. Verhoeff had pointed out that in these cases of siderosis bulbi there was a deposit of some nature in the sphincter muscle. There had been a good deal of controversy as to why these pupils did not react. From a pathologic standpoint, there was a great deal yet to be done in regard to these cases. In all the cases he had seen the pupils were immobile. All but two of the cases he saw had inflammation. He thought probably the nature of the foreign body had something to do with it.

Dr. Michael Goldenburg reported the case of a man, who received an injury to his eye about two years ago, to which he paid little or no attention until very recently, when he noticed that his vision in the eye was failing. After dilatation of the pupil with a mydriatic, he found a cataractous lens with typical siderosis spots all around the anterior surface of the periphery of the lens. Radiographs located a piece of metal 1 x 2 mm. in size back of the equator, and in the vitreous. The giant magnet was applied, but the patient did not experience any pain or pull on the make or break of the current. He then decided to make a triangular flap incision thru the sclera for direct attack. After accomplishing this, he inserted a small curved end piece with a hand magnet, and removed the piece of metal without any further difficulty.

Optical Iridectomies.

Dr. ROBERT VON DER HEYDT presented a boy, seven years of age, in whom he did bilateral optic iridectomies. Now the boy had vision of 20/50 in each eye. There were central cataracts. By that he meant a cataract which was much smaller than the so-called perinuclear or zonular cataract. This cataract was circumscribed and involved a small central area in the embryonic nucleus. All who had seen

this case would agree that in a small central cataract such as this, iridectomy rather than needling was indicated.

DISCUSSION.—Dr. Harry Woodruff said that many operators would have done the same as Dr. Von der Heydt did in this case. He remembered seeing a case of Dr. Beard's many years after he had done optic iridectomy. The man had gone on for years and had eventually developed cataracts. His vision had finally deteriorated on account of extension of the lens opacities, so that eventually he had to have cataract extraction.

If this case, which Dr. Von der Heydt had reported, had been his he would have advised a needling operation because after a successful needling the patient would have a clear round pupil which one could not obtain if one did zonula extraction; and therefore the chances of getting better vision than 20/50 would be very good.

Dr. Von der Heydt said that if he had a patient with a lamellar cataract and he had 20/70 vision he left him alone. Why should a needling operation have been done in this case? The patient was only 7 years of age. He was a little below the normal in mentality, therefore he could not accurately measure his visual acuity at this time. This cataract would not progress. It was circumscribed and fixed. If in the future he thought needling might be required he would then do it. He would keep the boy under observation. He thought a great improvement had been made in his case by the optic iridectomies.

FRANCIS LANE, Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY.

March 20, 1920.

EDWARD JACKSON presiding.

Recurrent Iritis.

E. T. BOYD, Denver, presented a man of about 58 years who had been shown to the society in January, 1919, on account of recurrent attacks of iritis. In January, 1919, there was an attack with

many adhesions, broken up under treatment. This attack was recovered from in about five weeks. During a more recent attack all the teeth had been extracted, and the patient promptly recovered. In the current month of this year the patient had developed another attack in the right eye. Previous examination of the nose, throat, and accessory sinuses had been negative, and during the later attack this examination had been repeated with the same result. There had recently been some sort of inflammatory rheumatism. The latest attack had been accompanied by hypopyon occupying one third of the anterior chamber. Would it be advisable to do an iridectomy to prevent recurrences?

DISCUSSION.—Melville Black, Denver, suggested that Dr. Boyd should have the patient's prostate milked to ascertain whether it harbored an infection. If an infection were found there it should be treated with a vaccine made from the discharge. It was uncertain how much good an iridectomy would do, or how much harm.

Lethargic Encephalitis.

W. A. SEDWICK, Denver, presented a case of lethargic encephalitis, in a youth of 15 years. The patient's tonsils and adenoids had been removed about seven years previously, because of numerous attacks of acute tonsillitis. On December 1, 1919, the patient noticed that he saw double, and went to bed on account of not feeling well. The next day the diplopia had disappeared at the time of getting up but returned after a few hours. On January 1, 1920, he went to bed with a temperature of 102°, and was very sleepy and hard to arouse. He was at that time nervous and jerky. This condition continued for a week. During the second week the temperature had gone and the other symptoms lessened, except the diplopia. This was taken to be an attack of influenza. When first seen by Dr. Sedwick on January 17, 1920, the patient showed marked diplopia both vertically and horizontally, the left eye being turned up and in. There was ptosis of both lids, the left much more marked. The pupils were normal in

reaction, and accommodation was not disturbed. The face was expressionless or mask-like. The patient fell asleep while sitting in the office, but it was not hard to arouse him. It was said that he would remain awake about five or ten minutes in a moving picture show, and then drop off to sleep. Apart from a possible very slight congestion of the capillaries of the fundi, the ophthalmoscopic examination was negative. The vision was normal with correction of a moderate astigmatism. At the time of reporting the squint was greatly lessened in the left eye, but the right eye seemed to turn in for the first time. The patient still tended to fall asleep.

DISCUSSION.—G. L. Strader, Cheyenne, Wyoming, had seen during the past two months an ex-soldier, the history of whose case was much the same as that of Dr. Sedwick's patient. The condition began with a high temperature and extreme headache, and the same lethargic condition. The left eye turned outward and upward. He had practically got well, altho once in a while experiencing a little diplopia. Depletion of the nasal tissues by suction after cocainization would produce improvement for a while. The patient had remained much better since resection of the turbinates and straightening of the septum had been done.

E. E. McKeown, Denver. Ten weeks ago a case came in complaining of blindness following la grippe. The patient stumbled over objects. The eye-grounds were negative, but the patient had since developed sleeping sickness. Special features of the case were that the patient was violent at times, and that he had a ravenous appetite.

Ophthalmic Herpes Zoster.

D. A. STRICKLER, Denver, presented a man aged 61 years who had a persistent corneal disturbance which seemed probably secondary to an acute neuralgic condition, perhaps herpes zoster. He was taken sick on December 23, 1919, with a chill followed by moderate rise of temperature. There was another chill December 24, and the patient was ill until January 3, 1920,

when he was taken to the contagious hospital with a diagnosis of erysipelas. After twenty-four hours, he was dismissed with the statement that the condition was not erysipelas, but some form of neuralgia. When first seen by Dr. Strickler on February 15, the cornea was hazy, especially in the lower half, and the eyeball moderately inflamed. There was photophobia. The vision of the right eye was 20/100, of the left 20/30. Under atropin, dionin, and high frequency current, the vision of the right eye on March 12 had risen to 20/30. There were three scars of blebs on the right forehead and scalp. Several corneal areas had from time to time become denuded of epithelium, and had healed slowly. The patient had never complained of pain in the eye.

DISCUSSION.—W. A. Sedwick, Denver, had had a similar case which cleared up under general treatment including tonics.

C. A. Ringle, Greeley. This is probably a trophic disturbance, and there will be a tendency for continued degeneration of the epithelium until the innervation recovers. By this time of course there will be more or less cicatrization.

Edward Jackson, Denver. The case is making fairly good progress. Altho the condition is probably of neurotrophic origin, the absence of pain would tend to rule out herpes zoster.

Infection of Fat Implantation.

A. C. MAGRUDER, Colorado Springs, presented a man who had lost his right eye as the result of a blow, and into whose orbit fat from the abdominal wall had been transplanted for prosthetic purposes. A severe infection with staphylococcus albus had developed simultaneously in the implanted fat, and also thruout the abdominal wound. The patient stated afterwards that any little scratch on the surface of his body would lead to pus formation.

Choroiditis; Field Defect.

J. M. Shields presented for W. M. BANE, Denver, a man aged 31 years who had come complaining of loss of vision in the upper portion of the left visual field. The vision was R. 5/4, L.

5/6. The right fundus showed a small pale area near the superior temporal vein, about a disc diameter from the disc. The left eye showed a larger area of choroiditis in the macular region, and two small hemorrhages between the optic disc and the macula. The shape of the area involved in the left eye corresponded closely to the blind area outlined by the perimeter, which extended from the center upward about ten degrees, and measured about ten degrees horizontally. The urine was negative with the exception of a very slight ring of albumin and a few casts. The history and other tests, including the Wassermann, were negative.

Squint; Voluntary Nystagmus; Operative Aphakia to Blind One Eye.

MELVILLE BLACK, Denver, presented a man aged 29 years in whom high hyperopia and convergent squint were associated with an extreme neurasthenia which had created special difficulty in treatment. In 1914, an eastern oculist had done one or two operations on the ocular muscles to correct the squint, and had given glasses for correction of the hyperopia. After the patient complained that muscle work had caused nystagmus and dizziness, the same oculist finally needled the lens of the right eye in order to put this eye out of use; but relief of the symptoms did not result. Later the lens became absorbed and the pupil partially clear. The patient professed inability to wear either correction of both eyes or correction of the left and a plano in the right. He maintained that when he relaxed his accommodation a very rapid lateral nystagmus of both eyes resulted but that he could control this nystagmus by concentration. Examination revealed that when he claimed to be relaxing he was really forcing his accommodation with an accompanying nystagmus, and that when his accommodation was relaxed there was no nystagmus. There seemed to be complete inability to persist with the hyperopic correction. The aphakic eye accepted + 16.00 sph \ominus + 1.00 cy. ax. 90°, and the correction of the left eye was + 4.50 sph. \ominus + 1.00 cy. ax. 90°

DISCUSSION.—H. R. Stilwill, Denver, had presented the same patient to the society in October, 1916. The man was at that time threatening suicide, and asked to have the right blinded, which Dr. Stilwill refused. Among the patient's nervous symptoms was a tendency not to pay his bills.

Edward Jackson, Denver, had also examined the patient at one time. The man was evidently from the first mentally unbalanced. With the ophthalmoscope, it was evident that while the eye was steady it was not accommodating. When he was moving the eye it was difficult to see the fundus, but the impression gained was that accommo-

dation was active. Binocular vision is a very delicate nerve adjustment, and it is quite possible that the antipathy to single vision which Graefe called attention to may exist in this and similar cases. In some cases where the attempt is made to produce diplopia and then fusion with prisms, as the images approach they suddenly jump over to the opposite side.

E. R. Neeper, Colorado Springs, felt that if it were really believed necessary to put one eye out of commission, it would be far preferable to turn the eye to one side by a muscle operation, rather than to blind it.

WM. H. CRISP, Secretary.

ABSTRACTS

Lindahl, C. Transillumination for Diagnosis of Tumors of Choroid. Uppsala Läkareföreningens Förhandlingar, vol. 25, p.1.

The author, in a well written and detailed article with many illustrations and colored plates, reviews the methods of transillumination of the eye; and describes a new one devised by himself, which he calls pupillary transillumination of the scleral wall. He uses a Nernst light modelled after that of Gullstrand for ophthalmoscopy. The lamp gives a very small but concentrated pencil of light. In using it, the eye is turned toward the lamp, the light directed thru the pupil illuminating the sclera opposite from the inside.

A detailed account of the appearance of the normal sclera, calling attention especially to the ciliary region, is given. The presence of a tumor is shown by a dark area in the illuminated field. Tumors are much more readily seen than by other methods of transillumination. The lamp can also be used for ordinary transillumination to better advantage than the old lamps on account of its stronger light.

In suspected tumors of the posterior half of the eyeball he uses in addition two procedures: (1) The method of Gullstrand using his light and an ordinary Morton ophthalmoscope. (2) Il-

luminating the eye thru the sclera with the author's light and observing the suspected area thru the pupil with the ophthalmoscope. In a serous detachment of the retina, the detachment will appear red with dark vessels. If on the other hand the area, or a part of it, appears dark, there is present a tumor or blood back of the retina. These two methods will always give positive findings for a posterior tumor provided that the tumor touches or lies close to the retina at any place which can be observed thru the pupil.

Dufour, M. Illumination in Ophthalmology. Ann. d'Ocul., 1919, vol. 156, p. 648.

Illumination of the eye for examination. For examination of the cornea, aqueous, iris, lens, and vitreous, the best illumination is the Gullstrand lamp. Failing this, the metallic filaments of lamps of low voltage furnish a great brilliancy. Such a light is especially useful if aided by a lens with an iris diaphragm; and if there is behind it a concave mirror whose optic center corresponds to the position of the filament.

On the other hand, for *ophthalmoscopic work*, it is better to have a small surface brilliantly illuminated by a bright light placed behind it, all of the useless

rays being arrested by a screen, and to make the examination in a dark room whose walls will not reflect lights. Lamps with visible filaments must not be used because the filament is projected upon the retina and the illumination is not uniform, thus annoying the observer. The Gullstrand lamp can be used by employing a concave mirror of about 15 cm. radius of curvature, so arranged that the reflected rays are perpendicular to the incident ones. In order to avoid the corneal reflex, it is necessary to center upon the pupil the entire shadow cast by the hole in the mirror. The Gullstrand lamp can be replaced by focussing upon a slit by means of a spheric lens, the filament of a lamp of low voltage. By means of another lens, furnished with a diaphragm, this image is focussed on a small mirror or a small prism with total reflection.

Illumination for the Operative Field. The projector type as used by dentists has the disadvantage of leaving the hands of the operator and his instruments in the shadow. This is overcome by an instrument made by Zeiss, with three mirrors and three projectors. The disadvantage is the necessity for an arc light. The author and Verain have devised an instrument which they call the scialytic, which consists of an arrangement similar to that used in light-house lenses, around which are arranged 50 plane mirrors in the form of a regular pyramid. The light obtained is uniform and any opaque object coming into its field does not cast a shadow. If the oculist cannot obtain a scialytic, he can make a substitute by using two bars at right angles in their middle parts. On each of the four ends a projector is attached, which can be directed so as to illuminate the entire operative field.

C. L.

Stuckey, E. J., and Hughes, C. A. *Trachoma Among the Chinese in France.* The China Medical Journal, v. 33, Nov., 1919, p. 522.

In the early drafts of Chinese coolies it was found that from 10% to 15% were suffering from trachoma when they arrived in France. This is sur-

prising, because each coolie had been medically examined in China before embarkation, and those having trachoma were supposed to have been rejected. The six weeks on board crowded transports, however, provided ideal conditions for the dissemination of the disease.

One of the most striking features of the examination in France was the clear evidence of the infectivity of trachoma. The men were examined in the order in which they bunked on shipboard. Again and again a long string of men showed no trachoma and then suddenly a series of five or six would show infection. It was generally possible to pick out from among these men the one who was the source of infection to the others. His would be a well marked case of chronic trachoma, while the other cases showed the trachoma granules in the beginning stages.

For the purpose of segregation and administration, the Chinese were divided following their examination in France into three classes:

Class "X", men with healthy conjunctivas.

Class "Z", cases of manifest trachoma.

Class "Y", cases of chronic conjunctivitis, or the border-line between "X" and "Z."

The men of Class "Z" were formed into companies and sent to special "Ophthalmic Treatment Centres," e. g. Calais and Boulogne, where they were constantly under supervision and treatment by ophthalmic specialists.

The men of Class "Y" were kept under treatment at the encampment hospital until they could either be diagnosed as free from trachoma, when they were transferred to "X" companies, or as infected when they were sent to join the "Y" companies at the Ophthalmic Treatment Centres.

As soon as the heavy incidence of trachoma in the early drafts was recognized, instructions were cabled to China to require a stricter examination of the eyes of all recruits and to reject

all men suffering from conjunctivitis. The "standard drops," zinc sulphat two grains to the ounce, were also ordered to be instilled daily during the voyage into the eyes of all the coolies. As a consequence the trachoma rate at once sank to 3%, and later to 1.6%.

The routine treatment of all cases with acute symptoms was to paint the everted lids with a 2% silver nitrat solution; of all chronic cases with copper sulphat. For a change of treatment, glycerol of a tannic acid (1-8) was used.

For prophylactic reasons the standard drops were ordered instilled into the eyes of all the Chinese in France. All face towels were ordered sterilized by boiling twice a week. Periodic inspection of all "clean" companies was also undertaken. The result of all these measures was very gratifying to all those concerned. H. J. H.

Harboe, Johan Fr. Methyl Alcohol Amblyopia. Norsk Magazin for Laegevidenskaben. Vol. 81. No. 4. P. 379.

The author gives what seems to be the first report of methyl alcohol poisoning with amblyopia that has appeared in Norwegian medical literature. While Norway has made consistent efforts to limit the use of alcoholics, it has never entirely forbid their sale. This fact may explain the rarity of wood alcohol poisoning. The article describes in detail the progress of a case, which resembles in general so many that have been reported in American literature.

The patient, a man of 24, drank about 10 cc. of methyl alcohol diluted with four times the amount of water on Aug. 5th, 1919. The 2nd day headache, nausea, and vomiting; the 3rd day a beginning diminution of vision, which fell on the 4th day to perception of light in the left eye and counting of fingers in the right. After the 9th day the vision began to improve. On Sept. 19th vision in the right eye 5/7.5, left eye 5/7.5; fields normal for white; perception of red and green doubtful; paralysis of accommodation both eyes; papillae slightly pale.

On Dec. 15, 1919, vision somewhat poorer than in Sept.; papillary pallor increased; blindness for red and green and paralysis of accommodation still present; central scotoma in left eye.

Moreau, F. Action of Emetin upon the Eyeball. Ann. d'Ocul., 1920, v. 157, p. 3.

A patient, who awoke with intense pain in the eyeballs, like needles, apparently had normal eyes, but showed with fluorescein, small, central, superficial corneal ulcers. Under lavage, the condition disappeared in two days. Interrogation showed that the patient, a physician, the day before, while making an injection, received a few drops of emetin in his face. Experiments on rabbits showed one violently affected, the other not at all. In 4 men, one was unaffected, and the others in varying degrees. The author refers to the case of Robinson. (A. J. O., April, 1918.)

C. L.

Gerard, Georges. The Curability of Trachoma by Naphthol-camphor-oxid. Ann. d'Ocul., 1919, v. 156, p. 747.

The solution should never be applied fresh. Two parts of camphor to one of naphthol are gently warmed, filtered and allowed to stand in a white flask until it has the consistency of syrup and a brownish color. A detailed description of the method of its application is given, consisting essentially of everting the lid and protecting the cornea by a fold of cloth. Pain is present immediately, also recurs some hours later. There is considerable injection and lacrimation. Applications are made 2-3 times a week, being supplemented by the use of either a 1% to 2% solution of tincture of iodine in water, as compresses 3-6 times a day, or increasing strengths of zinc chlorid (1-2,000 to 2%) 1 to 3 drops in the eye in the evening. There is immediate improvement in the acute forms, and the cases are cured without any scarring. The chronic types are also improved but the improvement is not so rapid nor so constant. C. L.

Magitot, A. Retinal Vascular Pressure in Posthemorrhagic Blindness. *Ann. d'Ocul.*, 1919, v. 156, p. 666.

The author observed the following in his case. (1) There was a disassociation between the general and retinal pressure, the former gradually increasing up to the 39th day, while the latter, at first very low, rapidly increased and attained the normal amount on the 26th day. Incidentally, the optic atrophy increased from the 9th to the 26th day. (2) The venous pulsation being spontaneously and almost continually present, the minimal pressure was evidently about the amount of ophthalmotonus. (3) The venous diastolic and systolic pressures were very nearly the same. Simply touching the eyeball caused the central vein to disappear. (4) The optic atrophy was probably due to the fact that the general blood pressure was hardly strong enough to force the blood into the eye. The history shows a sequence of hemorrhage, syncope, deafness, and blindness, followed by return of consciousness, and audition, with only partial restoration of sight. (5) Blindness could probably have been prevented if the patient had been kept with her head low, possibly in the Trendelenburg position, and if injection of serum or adrenalin had been used to cause increase in blood pressure. C. L.

Terson, A. Equatorial Ophthalmotomy in Recurrent Glaucoma. *Ann. d'Ocul.*, 1919, v. 156, p. 528.

The author reports a case upon which a bilateral iridectomy had been performed. The beneficial results obtained, however, were only temporary, and he later performed a T shaped equatorial sclerotomy on both eyes with resulting visual acuity, R. 0.1, L. 0.2. With convex and cylindrical lenses, the patient was able to read newspaper print. Tension became normal and other symptoms disappeared. This result has remained permanent. Pilocarpin has been used every other day, as a precautionary measure. A brief discussion of sclerotomy in glaucoma is given. C. L.

Duhamel, A. Use of Elasticity of Vessels in the Treatment of Ptoxis. *Ann. d'Ocul.*, 1919, v. 156, p. 615.

The author treated a case of congenital ptosis by the following method, obtaining an almost normal function. A cutaneous incision was made 3 1/2 cm. long, a little below the inferior border of the orbital ridge. Dissection and isolating of a vein about 3 cm. long was effected. By means of catgut the two ends were fixed to the inferior border of the frontal muscle; and the top of the loop to the upper border of the tarsus, thru a buttonhole in the orbicularis. Resection of a small cutaneous rectangle was made and suture applied. C. L.

Lindgren, E. Case of Mikulicz Disease. *Hospitalstidende*, vol. 63, p. 18.

The patient, a girl of 12, gave no personal or family history of tuberculosis. There had been a mild fever for 5 or 6 days. Examination revealed a hard, indolent swelling of both tear glands, and a corresponding swelling of all the salivary glands, especially the parotid. Besides all palpable lymph glands showed some swelling. Spleen and liver normal; von Pirquet, negative,—hemoglobin 80%. The condition of the glands remained constant. The anemia increased steadily, swelling of spleen and liver appeared with a heart murmur, and death followed after a course of seven weeks. D. L. T.

Lapersonne, F. de, and Sendral. Results of Ligation of Common Carotid in Traumatic Exophthalmos. *Arch. d'Opht.*, v. 36, 1920, p. 8.

These authors point out that the mortality from ligation of the common carotid has been always less when the operation was performed for traumatic exophthalmos than when done for any other purpose, 7% as against 38% of all cases and 54% for ligation to check hemorrhage. Since the development of asepsis the mortality has still farther declined.

They report two cases treated in this manner. One was of monocular late exophthalmos following traumatic aneurysm of the internal carotid. The

man, aged 37, was injured by fragments of a shell. Forty-five days after the injury the right eye was prominent with chemosis, enlarged conjunctival vessels, and obstruction of the veins in the retina. A month later there was a detachment of the retina of the left eye and increase of the original symptoms. At the end of two years and ten months the right common carotid was tied. Forty days later the patient was free from bruit, prominence of the eyeball was very slight, the conjunctival vessels were still a little swollen and varicose and the venous circulation of the retina had not returned to normal.

The second case was one of bilateral traumatic exophthalmos due to arterio-venous aneurysm by rupture of the carotid in the cavernous sinus. The exophthalmos had appeared 48 hours after fracture of the base of the cranium. Two months later there was marked double exophthalmos, greater in the right eye, total ophthalmoplegia, and ptosis, chemosis and ectropion of the right lower lid, with the usual physical signs of aneurism. Four months after injury the right common carotid was ligated, causing slight improvement. Five months later the left common carotid was ligated without causing serious cerebral symptoms. The result was very satisfactory and twenty-two months after the second operation vision had improved so that the patient could write with ease. There was little bruit, movements of the eyeballs were partially restored, and cerebral symptoms were absent.

These authors think that ligation of the common carotid is the treatment of choice for such cases. They make no mention of ligation of the orbital veins, which has also proved successful.

E. J.

Rochon-Duvigneaud. (Institute of Ocular Physiology.) *Ann. d'Ocul.*, 1919, v. 156, p. 313.

The author, on behalf of his committee, made a report to the Societe d'Ophthalmologie de Paris and to the Societe francaise d'Ophthalmologie, advising the establishment of an insti-

tute of the character of l'institut Pasteur. It should consist of a laboratory for physiology of the eyeball (tension, for ophthalmic biology, human and comparative anatomy and histology, for physiology of the eyeball (tension, circulation, innervation, retinal function), for experimental surgery (grafts, regeneration, fistulization, etc), and finally for bacteriology. In addition, there should be sufficient radiologic and photographic equipment. There should be a permanent scientific personnel and space for men desiring to do research work. This would create a nucleus around which would grow a worthy institution.

C. L.

Holm, Ejler. **A case of Atrophic Uveitis.** *Hospitalstidende*, vol. 63, No. 11, p. 13.

The patient was a woman of 48 with symptoms of a beginning glaucoma of the right eye. The symptoms increased and an Elliot operation was done with technically good results. But after about three weeks the vision had disappeared and the eye had to be enucleated. The case acted in many respects like a so-called malignant glaucoma; but microscopic sections showed an excessive atrophy of the whole uveal tract.

D. L. T.

De Carvalho, J. P. **Treatment of War Mutilations of Lids by Autoplastic Method of Snodacker—Morax.** *Ann. d'Ocul.*, 1919, v. 156, p. 597.

The author describes the technic, and gives 3 cases in detail, with report on a total of twelve other cases. His first case was one of nasofacial and orbital mutilation, with orbitonasal fistula. Seven operations were done without success. Finally the Snodacker-Morax operation was performed with good result, but some suppuration from the orbital cavity persisted. The second case was one of anophthalmia and cicatricial ectropion, in which a good result was obtained. The third case was also anophthalmia and cicatricial ectropion, complicated by nasal fistula, in which the result was good, but allowed the use of only a small prosthesis.

C. L.

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AMERICAN JOURNAL OF OPHTHALMOLOGY, 7 West Madison St., Chicago, Ill.

ADOLF ALT.

Dr. Adolf Alt, for 34 years editor of the American Journal of Ophthalmology, died at his home in St. Louis, June 28th, 1920. For many months he had been very ill and his recovery not expected. His last published article was his account of his own American Journal of Ophthalmology, published in volume 1, p. 146 of this Journal, more than two years ago.

He was the son of Dr. Dittmar Alt of Mannheim, Germany, and studied medicine at the University of Heidelberg, taking his degree there in 1875. He soon determined to cast his lot in the new countries across the sea. Going first to Canada, he became a member of the College of Physicians and Surgeons of Ontario in 1877; and Lecturer on Ophthalmology and Otolaryngology in Trinity Medical School, Toronto. In 1880 he published the first edition of his Lectures on the Human Eye, in which a large proportion of the 95 illustrations are devoted to the anatomy and pathology of the organ. His many contributions to his journal dealt largely with pathology. His work

on pathology helped to give value and importance to the clinical observations of many of his colleagues, and to make a reputation for American science among European ophthalmologists, who at one time thought rather contemptuously of "practical" papers written in America, altho some of their ideas they have since adopted.

He settled in St. Louis in 1885. He soon won and retained the confidence and respect of leading ophthalmologists of his newly adopted country. When in 1884 he started the American Journal of Ophthalmology, he gathered as collaborators a group of well-known American ophthalmologists, who gave him active literary support for many years. This was the first monthly ophthalmic journal published in America, and the third in the world. He encountered a skepticism that thought it "preposterous" to try to publish an ophthalmic journal in the western part of the United States, but held his course and, with such assistance as he could get, put out a series of volumes to which the student must go to find many valuable observations.

He continued loyal to the scientific interests of the West. He became a member of the American Ophthalmological Society in 1882, but only once, in 1899, did he contribute to its program. On the other hand he took an active part in the organization of the Western Ophthalmologic and Otolaryngologic Association in 1896, was its first president, and the only one who held that office two succeeding terms. During its early years he published the ophthalmic portion of its proceedings in his journal, and had them reprinted to enable the Society to put out an annual volume of transactions. When the association was reorganized in 1903 under the name, American Academy of Ophthalmology and Otolaryngology, and began to publish its own transactions, he continued his active interest and support of its meetings. He also attended and contributed to the scientific program of Western Meetings of the American Medical Association, being chosen chairman of the Section on Ophthalmology for the meeting of 1911.

Thru a professional life of 45 years, Dr. Alt continued a quiet, unobtrusive, steady worker in ophthalmic science, a sound professional adviser, a serious, intelligent teacher, a worker for the organization of his profession, and a contributor to its permanent fund of knowledge.

E. J.

THE STUDY OF BINOCULAR DIPLOPIA.

Double vision is a symptom so disturbing to the patient and of such varying significance as to mechanism, etiology, prognosis, and treatment, that it is worthy of more systematic and detailed study than it often receives. Even in the larger text books the detached, fragmentary, incidental references to it are not in keeping with the importance it has in the patient's mind, or the need there is to make it the subject of a definite investigation.

From the account the patient gives of his seeing double, it is often possible to guess with great probability the nature and significance of the diplopia he

complains of. But there is no reason for the ophthalmologist to guess, when by application of established methods of examination, he can know the form and importance of the symptom he has to deal with.

The first step is to ascertain if the diplopia is "monocular" or "binocular," by covering one eye and finding if the doubling of images disappears. Each eye should be covered in turn. It is possible for one eye to present a "monocular diplopia" while the other is quite free from any such fault. In such a case, covering the defective eye promptly ends the double vision and gives the impression that the diplopia is binocular. But covering the good eye leaves the diplopia unaffected, and reveals its "monocular" character. This alternate covering of the eyes shows us if the diplopia is "monocular" or "binocular"; but this is only the beginning of a proper study of the symptom in any given case.

The next step is to identify each of the images with the eye to which it belongs. To do this we must first get into relation with the patient's understanding and description of the two images he perceives. They may be distinguished as "right" and "left," "upper" and "lower," "straight" (vertical) and "twisted" (oblique), or "distinct" and "faint." But it is essential that some plan of distinguishing between them shall be mutually agreed upon, and understood by both surgeon and patient. With such an understanding there are various ways in which each image may be connected with the eye to which it belongs.

The simplest way is to cover one eye and have the patient tell which image disappears. If the images are sufficiently separate, and have a definite constant relation to one another, and the patient is an accurate observer and there are no complicating conditions, this method gives the desired information very quickly and without any special apparatus. But several conditions are apt to detract from its value. If the images are not clear and fully separated it may be difficult for the patient to decide which disappears when an

eye is covered. Many patients are not good observers, and even repeated trials yield answers of uncertain significance. Superior visual acuity in the eye with a paralyzed muscle may cause it to fix the object when both eyes are in use. But when the fixing eye is covered the other eye quickly shifts to fix the object in its true position and this may give the impression that its image is the one that has been suppressed.

The above liability to error is associated with the necessity for determining the relation of the images during the instant that one of them is being eliminated. It is removed by giving the patient plenty of time to compare the two images, as when one is distinguished from the other by placing a red glass before one eye. When one image is recognized as red and the other as white, the former is known to belong to the eye with the red glass before it; the identification is readily confirmed by covering one eye, and the relative positions of the two images can be repeatedly observed and described by the patient until all uncertainty or chance of error is removed.

The red glass test is most satisfactory when the object fixed is a fairly bright white light with a dark background, and when the visual acuity of the two eyes is about equal. If one eye sees better than the other, we place the red glass before the better eye, or in other ways reduce its visual acuity to about that of the worse eye, at the same time making it easy to see both images by using a bright source of light with a dark background. Where diplopia is artificially produced by use of a strong prism, the direction in which the base of the prism is turned serves to identify the image displaced in the opposite direction, as belonging to that eye.

It is also possible to identify the image by covering one eye with a strong convex glass, and thus blurring one while the other remains distinct. This is a method sometimes found convenient where a dark room and clear light are not available for the red glass test, and it is applicable at the reading distance. A star or letter or a short

word is traced on the center of a sheet of paper. If the eyes are about emmetropic, a convex 3.D. is placed before one eye and a convex 6.D. before the other. With the paper held at a distance of 12 or 15 inches, one eye will see the test clearly, and the other so indistinctly as to make the identification easy.

The third step in the diagnosis of diplopia is to determine the amount of separation of the two images and how this varies in different parts of the field of fixation. In some ways the separation of the images is measured most simply by the strength of prism required to fuse them, and this method at least gives information regarding the extent of the obstacle to single binocular vision. It does not, however, indicate with certainty the real separation of the visual axes in the position of rest or greatest relaxation. This is better measured by one of the methods that eliminate all effort to secure fusion, as the parallax test, where the eyes are alternately covered and the apparent jump of the light looked at is reduced to nothing by prisms before the eyes, placed so as to "correct" the diplopia. It may also be measured by the phorometer method—making fusion impossible, and then ascertaining what prisms are required to bring the two images in the same vertical or horizontal plane.

Where the separation of the images is fairly constant, and the patient sufficiently observant and intelligent, the tangent scale of Maddox or Ziegler gives a rapid and fairly accurate method. With it the image belonging to the deviating eye is oriented on the scale, and the patient himself reads off the amount of his deviation. This requires enough general illumination to read the figures on the scale with the fixing eye. But the observation can be facilitated by using a specially brilliant test light seen against a dark uniform background, and shading the deviating eye so that the figures of the scale will be invisible or very faintly visible to it. One can prepare such a scale for himself of a size to suit the place it is to be used: A distance of the scale from

the patient of one meter or more, is sufficient for ordinary purposes.

Finally the variations in the separation of the two images in different parts of the field of fixation should be studied. For this our methods give only approximate results but these serve the practical purposes in view. The limits of the field of fixation can be accurately determined subjectively, only by the trained observer after repeated observations. For patients it is better fixed objectively with the corneal reflex test, and no way has been worked out for measuring at the same time the separation of the patient's double images. Complete fixation of the patient's head is very difficult to get when his eyes are turned as strongly as possible in first one direction and then another.

For practical, approximate methods, the patient's head may be fixed with chin rest and biting fixation, or the surgeon's hand placed on it, and the test light carried successively into various parts of his visual field, while he states whether the images separate more widely or tend to come together, either vertically or horizontally, or tend to become more nearly parallel or more oblique. Or, with the test light fixed directly in front of the patient, as it is used in testing muscle balance in the physiologic primary position, the patient's head may be turned in different directions and the separation of the two images actually measured by prisms. Thus the head being turned strongly to the right, the effect produced on the diplopia is that of turning the eyes to the left, throwing the head far back is equivalent to looking down; and so for all parts of the field. This measurement of the separation of the images in various parts of the field should be made in every clinical case of diplopia, or decided heterophoria.

It will be noted that in this discussion of the subject no mention has been made of the "true" or the "false" image. With the data before us obtained by the methods mentioned, the discrimination between the two, or be-

tween the "fixing" and the "deviating" eye is readily made by a simple process of reasoning from known physiologic data. Like other reasoning about our cases, it is only valuable as based on accurate observations, and should be deferred until the observations have been carefully made. The emphasis placed upon discrimination between the "true" and "false" images comes down to us from a time that squint was imperfectly understood; and fixing attention on it prematurely hinders rather than helps the diagnosis.

E. J.

EXAMINATIONS AND CASE RECORDS.

The American Board for Ophthalmic Examinations will hold its next examinations at Kansas City, October 13, the day before the meeting of the American Academy of Ophthalmology and Otolaryngology. These are the first examinations of the kind that have been held west of the Mississippi. They are also the last that will be held before the requirement of the Academy, and of the American Ophthalmological Society goes into effect, that candidates for membership in those organizations shall have the certificate of the Board.

The case reports demanded of those seeking this certificate have become a most important part of the examination, and in some instances no farther examination is required. These case reports must be submitted at least sixty days before the date for the examination. This may seem a rather long period, but it is quite short enough. In connection with the examinations at New Orleans in April, there were about 600 case records to be critically read, and rated. When it is remembered that these records have to be sent from one place to another to reach the different examiners, it can be understood that the requirement is quite necessary.

These case reports should not be of rare and interesting cases, but of a wide variety of the more usual cases, carefully worked out. They should

show especially the candidate's methods of diagnosis and treatment; the features in the case that justify a certain diagnosis or therapeutic procedure, or which negative a conclusion that other features of the case seem to indicate. If the case is reported because it has been operated on, the report should show, beside the reasons for operation, the methods of preparing the patient, and instruments, the exact steps of operation, the after treatment, and especially the end result.

Many men have had their methods of case taking and recording greatly improved by the "paper work" they have been compelled to do in military service. But all would be benefited by giving additional thought and attention to the subject. A good case record presupposes a good understanding of the condition, and a good grasp of the particular case. If the emphasis laid upon them in connection with ophthalmic examinations leads any ophthalmologist to greater thoroughness in regard to them, his effort will have been wisely expended.

E. J.

BOOK NOTICES.

Wilbrand, H., and Saenger, A. *Die Neurologie des Auges. VII Bd. Der Erkrankungen der Sehbahn vom Tractus bis in den Cortex.* Large 8 vo. 630 pages, 1 plate and 371 illustrations in the Text. Bound in Paper. Wiesbaden: J. F. Bergmann, 1917.

This handbook for neurologists and ophthalmologists begun in 1900 is nearing completion, the early issue of the final volume being now promised. The volumes already published include over 4,000 pages; and constitute a great storehouse of information regarding the neurology of the eyes.

The subjects considered in the several volumes are: I The Nervous System and the Eyelids. II The Nervous System and the Lacrimal Apparatus, Conjunctiva and Cornea. III The Anatomy and Physiology of the Optic Tracts and Centres, and the General Diagnosis and Symptomatology of

Visual Disturbances. IV The Pathology of the Retina, and Diseases of the Optic Nerve Head. V The Diseases of the Optic Nerve Trunk. VI The Diseases of the Chiasm. VII The Diseases of the Optic Paths from the Tracts to the Cortex. Volume VIII will treat of the Eye Muscles, Pupil and Accommodation.

A fair understanding of the scope and contents of this colossal work may be obtained from an inspection of this volume. It is calculated to give one a sense of the vastness of the subject, and of the impossibility of mastering all parts even of ocular pathology.

This seventh volume of the work opens with some general discussion of homonymous hemianopsia, and then takes up various types of this condition of which it distinguishes thirty. First comes complete hemianopsia, subdivided into typical, complete half blindness, and hemianopsia of the color fields. Then under incomplete hemianopsia we find 14 different types, including hemianopic central scotoma, 9 forms of quadrant hemianopsia, sector defects, zonular defects, and island defects in the field. Then double or bilateral homonymous hemianopsia is taken up, the cases being classified under 9 types, including hemianopsia for colors, central hemianopic scotoma, and various quadrant anopsias. Next loss of the general field of vision with retention of some insular part is considered, and of this six types are recognized, most of them produced by complete homonymous hemianopsia on one side, and incomplete on the other.

The etiology of homonymous hemianopsia next claims attention. First the infections are taken up, beginning with syphilis, then the poisons, multiple sclerosis, parencephalitis, pseudobulbar paralysis, and tumors, the last occupying 40 pages; then brain abscesses, injuries to the skull, gunshot wounds, disease of the vessels of the brain, and cerebral softening.

The occurrence and course of homonymous hemianopsia next claim attention; and then the prognosis both as to visual impairments and disturbances of orientation. Other sections

deal with mind-blindness, the diagnosis of hemianopsia including the diagnosis of localization under many subheadings. The volume is completed by a bibliography of 1263 titles, an alphabetic index of subjects, index of author's names, and an appendix of 25 pages setting forth the author's views on the organization of the cortical visual centers.

To illustrate the way in which the subjects are handled, we take the section under etiology, headed homonymous hemianopsia with syphilis, 17 pages. This is divided into syphilis with vascular disease, with softening, with basal gummatous meningitis, with gummatous tumors, and with paralysis. In the page and a half given to gummatous tumors we find abstracts giving the important features of 7 cases bearing upon this subject, references being given to 3 other cases described in connection with other subdivisions of the topic. Almost every page is crowded with such abstracts arranged to focus the information they contain upon the special topic under consideration.

One who has not examined this work in detail cannot conceive of the enormous accumulation of clinical experience it represents, and the information is drawn from widely scattered sources; almost 10 per cent of the references are from American publications. The industry and intelligent direction that have brought together and arranged so much of this department of knowledge are worthy of high appreciation and respect.

E. J.

BIOGRAPHIC SKETCHES.

THOMAS H. SHASTID, M.D.,

SUPERIOR, WISCONSIN.

CALLAN, LEWIS WHITE. This well known New York ophthalmologist, son of Dr. Peter A. Callan, was born in New York City Sept. 4, 1877. He went to Yale College, but did not graduate. His M.D. was received at the University of Pennsylvania in 1901. Having studied ophthalmology at the New York Eye and Ear Infirmary till 1902,

he practised as ophthalmologist in New York City from that time till his death. He was, for a number of years, ophthalmic surgeon to the New York Eye and Ear Infirmary, St. Bartholomew's and Lying-In Hospitals. He was a Fellow of the New York Academy of Medicine, a member of the American Ophthalmological Society. He was a tall, lean man, of fair complexion, and with blue eyes and light hair. He was a member of the Yale Club, the Calumet Club, and of various golf associations. He died at the Yale Club, New York City, Jan. 21, 1920, of pneumonia, leaving a widow but no children.

CONNELL, EDWARD JOSEPH. An ophthalmologist and otolaryngologist of New York City. Born in New York City May 1, 1876, he received his medical degree at Cornell University Medical College, in 1899, and practised as ophthalmologist in New York City from that time till his death. He was assistant otologist to the Lincoln Hospital, assistant ophthalmic and aural surgeon at the Fordham University Dispensary. He was a rather tall, lean man, smooth-faced, of a ruddy complexion, and with blue eyes and black hair. He was very quiet and retiring in disposition. He married, on Dec. 21, 1912, Frances Helene Tucker, by whom he had one child, Loraine Frances. He died of pneumonia, April 11, 1920.

PITTS, BARTON. A well known ophthalmologist of St. Joseph, Mo. He was born in Accomac Co., Va., Oct. 17, 1859, son of Edward Parker, and Mary Robertson Dennis, Pitts. His medical degree was received at the University of Maryland, Baltimore, in 1881. For a very short time he engaged in general practice in Virginia, then removed to St. Joseph. Here, as it seems, he practised from the beginning of his residence the eye, ear, nose and throat alone. He was, for several years, Professor of Ophthalmology at Ensworth Medical College. He married, April 18, 1895, Edna M. Steele. To the union were born two children, Mildred Steele and Beverly L. The Doctor was a large, stout man, a brunette, with dark grey eyes and iron gray hair. He was

a very sociable and kindly man, a Democrat, an Episcopalian. He died of heart disease, Mar. 10, 1920.

REYLING, FREDERICK THOMAS. A well known ophthalmologist and otolaryngologist, as well as teacher of histology, pathology, bacteriology, and some other branches. He was born in Havana, Cuba, Dec. 29, 1859, son of George and Catherine Esterina Muro, Reyling. He came to New York when a boy, and received a liberal education at the University of New York, at which institution, in 1884, he received also the M.D. After a brief period of general practice, he studied the eye, ear, nose and throat, and from that time forward practiced as a specialist in those branches. For a time he was Professor of Pathology at his alma mater, and Professor of *Materia Medica* and Therapeutics in the New York College of Comparative Histology and Veterinary Surgery, as well as visiting ophthalmic surgeon to the Manhattan Eye, Ear, Nose and Throat Hospital.

In 1896 he removed to Kansas City, Mo. Here he practised as ophthalmologist and otolaryngologist, but was also, from 1899 to 1901, Professor of Histology and Pathology in the University Medical College, and, from 1901 to 1905, Professor of Histology, Pathology, and Bacteriology in the Kansas City College of Physicians and Surgeons.

Dr. Reyling was a small, lean man, of a fair complexion, but with dark brown eyes and black hair. He was very quiet, in his manner, a man of few words but many friends.

He married a Miss Bertha Weisser, by whom he had five children, Catherine, Fred, Sophia, Leo, and Clemence.

The doctor died, Feb. 24, 1920, after a week's illness from pneumonia.

RISLEY, SAMUEL DOTY. A famous ophthalmologist of Philadelphia. He was born at Cincinnati, O., Jan. 17, 1845, son of John S., and Mary Parker, Risley. His medical degree was received at the University of Pennsylvania in 1870. For the next two years he engaged in general practice. Hav-

ing studied the eye at the Wills Eye Hospital and at the University of Pennsylvania under William F. Norris, he engaged, in 1872, in the practice of diseases of the eye exclusively.

He was Lecturer and Assistant Surgeon in ophthalmology at his alma mater from 1872 to 1879; professor of diseases of the eye in the Philadelphia Polyclinic from 1886 to 1900, and emeritus professor thereafter; attending surgeon to Wills Eye Hospital, Philadelphia, 1890; a member of the board of managers of the Pennsylvania Training School for Feeble-Minded; alumni manager of the University of Pennsylvania Hospital since 1896. He was Chairman of the Section on Ophthalmology of the American Medical Association in 1893, a member of the House of Delegates in 1907, President of the American Academy of Medicine in 1891, Chairman of the Ophthalmological Section of the College of Physicians of Philadelphia in 1904 and of the American Ophthalmological Society in 1907. He was a member of the International Congress of Ophthalmology at Edinburgh, Scotland, in 1894, and at Utrecht, Holland, in 1899.

Among the doctor's more important articles were "The Comparative Value of Mydriatics," "School Hygiene," "The Genesis of the Myopic Eye," and "The Etiology of Uveitis." He devised a form of a "rotary prism" for the measurement of ocular imbalance, a phorometer, an ophthalmoscope combining cylinders with the usual spheres, a secondary cataract knife with its blade hand tooled so that the shaft, equalling the size of the corneal puncture, served as a check to the escape of vitreous.

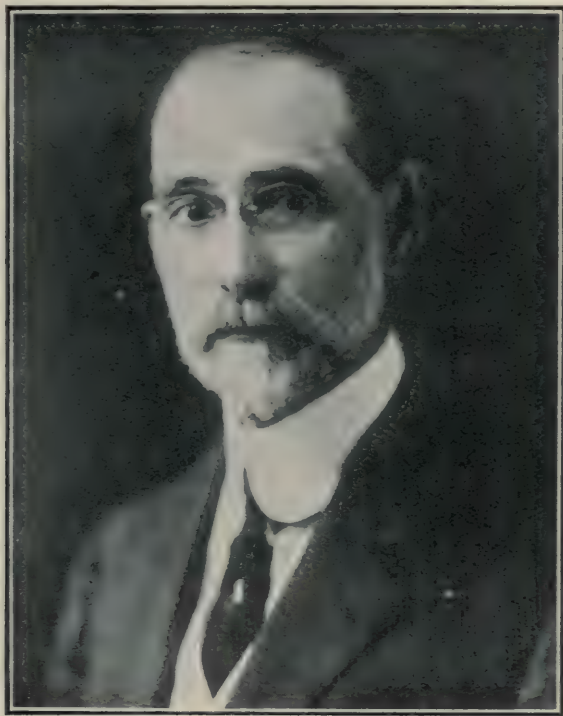
Dr. Risley was twice married. First to Emma D. Thompson, on Mar. 11, 1870. To the union were born: Arthur Doty Risley, Sandusky, Ohio; Florence G. Risley, deceased; Helen Irma Ensor, Mt. Washington, Md.; Dr. John Norman Risley, New Bedford, Mass.; and R. Hildegarde Price, St. Paul, Minn. Dr. Risley married Julia Louise Robinson, on Jan. 16, 1907. To the union were born Parker Curtain Ris-

ley and Louise Risley, both of Media, Penna.

Dr. Risley was tall, rather slender, of a good complexion, and with dark brown eyes and iron gray hair. As a rule he wore a Van Dyke beard. He was a very social, kindly man, fraternal, cooperative, and especially helpful

medicine at Hickory, N. C., and took a special course at the Presbyterian Eye, Ear, Nose and Throat Hospital, of Baltimore, his chief instructor being Prof. Hiram Woods.

In 1900 he began to practice the eye, ear, nose and throat at Charlotte, N. C., where he was one of the organizers of



Samuel Doty Risley, 1845-1920.

to the younger members of his specialty. He was active for public education, a Republican in politics, a member of the Protestant Episcopal church.

He died April 1, 1920, from lethargic encephalitis.

RUSSELL, E. REID. An ophthalmologist and otolaryngologist of Asheville, N. C., was born at High Point, N. C., son of M. H. and Nancy Harris, Russell, on April 2, 1870. He received his first degree at the Virginia Military Institute, Lexington, Va., and his Doctor of Medicine, in 1895, at the University of Maryland.

For four years he practised general

the Presbyterian Hospital. For a number of years he was Professor of Eye, Ear, Nose and Throat at Davidson and Charlotte. In 1904 he was elected President of the Charlotte Medical Society.

In 1910 he removed to Asheville, where he lived and practised till his death. On a number of occasions he made brief trips to Europe for the purpose of studying his specialties.

On Oct. 12, 1897, Dr. Russell married Miss Fannie Marler, of Hickory, by whom he had two sons. Late in November, 1919, the doctor received an infected wound of the hand, from which he died Nov. 27, 1919.

SHORTER, JAMES H. An eye and ear specialist of Macon, Ga. He was born near Seale, in Russell Co., Ala., in 1842. During the War he served in the Confederate army, and afterwards managed his mother's farms in Alabama. Having received his medical degree at the Long Island College Hospital in 1875, he studied the eye, ear, nose and throat with Dr. Hermann Knapp, and, for a time, practised as specialist in New York City. In 1890 he removed to Macon, Ga., where he practised as ophthalmologist and otolaryngologist until nearly the time of his death. He was a member of the American Academy of Ophthalmology and Otolaryngology, and of the American Laryngological, Rhinological and Otological Society. He died Feb. 2, 1920, after an illness of five months.

VALK, FRANCIS. A famous ophthalmologist of New York City, inventor of numerous ophthalmic instruments and author of the well known handbooks, "Errors of Refraction" and "Strabismus." He was born at Flushing, N. Y., son of a well known physician, William W. Valk, and Jane Sherwood (Jones) Valk, Oct. 28, 1846. He received a classical training at Washington College, Chestertown, Maryland, and the M.D. at New York University in 1878. During the War he enlisted in the northern army. For a time he was assistant surgeon to the Manhattan Eye and Ear Infirmary, and later surgeon. For very many years he was ophthalmic surgeon to the New York Dispensary and surgeon and visiting ophthalmologist to the Randall's Island Hospital, as well as consulting ophthalmic surgeon to the Thrall Hospital, Middletown, N. Y. He was Professor of Ophthalmology at the New York Post Graduate Medical School for many years, and Emeritus Professor for a brief time before his death. He was a Fellow of the New York Academy of Medicine, of the American Academy of Ophthalmology and Otolaryngology, the Clinical Society of the New York Post Graduate Medical

School and Hospital, and many other medical societies, both general and special. Among the instruments which he invented were the Twin Strabismus Hooks and Needle-Point Cystitome.

Dr. Valk was a man of striking appearance and personality. He was six feet high, erect, slender of build, and with very sloping shoulders. His hair, mustache and imperial were all, in his later years, snow white. He affected the dress of a Methodist minister, and, altho a northern man by birth and residence, was almost invariably mistaken for a southerner. The writer remembers well his striking southern drawl and southern pronunciation. He almost always arose, at meetings, to discuss muscle conditions of the eyes, and was very clever, thoro, and forceful in his arguments. When speaking, he had a way of stooping over and gently bringing together the palms of his hands, which gave to all that he said an air of special earnestness.

He was always kindly and sympathetic, and the writer can never forget the warm-hearted manner in which he used to say: "Good-bye" to a student at the "P. G.," and to add: "Now *some* day, Doctor, *some* day, I know we shall meet again." He also had a way of asking students who had finished his course in ophthalmology at the Post-Graduate, to write to him fully, whenever they had a case on hand which gave them special trouble. "I shall always be glad to hear from you, you know," he would say. And his listener knew that he meant it.

Dr. Valk married, at Washington, D. C., in August, 1874, Miss Marian C. Easby of that city. To the union were born the following: Francis M. Valk, Mrs. Elizabeth V. Hay, and Jane Sherwood Valk.

The doctor died at St. Luke's Hospital, New York City, November 5 1919.

One cannot refrain from adding, in the words of the dear old teacher himself: "Good-bye, Doctor. I know that, *some* time, we shall meet again."

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities.

DEATHS.

Dr. Adolf Alt, St. Louis, Mo., died June 28, aged 69 years.

Dr. Henry Barnabas Hill, Logansport, Ind., died May 24, aged 54. He had practiced ophthalmology in Logansport for twenty-five years.

SOCIETIES.

The American Academy of Ophthalmology and Oto-Laryngology will meet in Kansas City, Mo., October 14, 15 and 16.

The eleventh assembly of the Sociedad Oftalmologica Hispano-Americanos will convene at Granada, September 20 to 23. The subject for discussion will be "Hereditary Syphilis."

The eye, ear, nose and throat section of the Buchanan County Medical Society was organized at St. Joseph, Mo., March 10. Dr. Pierre J. Leonard was elected chairman, and Dr. William L. Kenney secretary of the section.

The Clinical Congress of the American College of Surgeons will this year be held at Montreal, October 11 to 15. The opportunities for seeing eye work in that city, altho excellent in quality, are limited in quantity, and as admission to the clinics is entirely by ticket, those who expect to attend them should make application early.

PERSONAL.

Dr. H. Bert. Ellis and George H. Kress, of Los Angeles, have formed a partnership.

Mr. A. H. H. Sinclair, of Edinburgh, Scotland, attended the meeting of the American Ophthalmological Society in June. He is spending several weeks in the United States.

Dr. Luther C. Peter, of Philadelphia, has gone abroad to attend the meeting of the Oxford Ophthalmological Congress and to present the claims of the International Ophthalmological Congress to be held in Washington in 1922.

Dr. Edward Jackson spent some time in Washington, D. C., looking over facilities for entertaining the International Congress of Ophthalmology, which meets in that city in April, 1922.

Dr. Marcus Feingold, of New Orleans, Dr. Emory Hill, of Richmond, Va., Dr. William C. Finnoff, of Denver, Colo., Dr. A. O.

Pfingst, of Louisville, Ky., and Dr. Wm. H. Roberts, of Pasadena, Calif., were this year elected to membership in the American Ophthalmological Society.

Dr. R. Pacheco-Luna, of Guatemala, is taking a two years' vacation and is at present in San Francisco. He expects to travel eastward in the fall and land in Paris next winter. He is a member of the Committee on Organization of the International Congress of Ophthalmology, which meets in Washington in 1922. He expects to promote abroad an interest in this meeting that will result in an increase in the attendance.

Dr. Howard Forde Hansell, professor of ophthalmology in Jefferson Medical College of Philadelphia, with Mrs. Hansell, sailed for Europe June 19 to spend the summer in travel that will include the battlefields of Belgium and France.

Dr. William M. Sweet, of Jefferson Medical College of Philadelphia, with Mrs. Sweet, sailed for Europe early in July to spend the summer, mainly at Aix-le-Bains, France.

Dr. Burton Chance, surgeon of Wills Eye Hospital of Philadelphia, with his family, is spending the summer in camp at the Ponoco Lake Preserve. Dr. Chance has recently moved to 1305 Spruce street.

Dr. William Campbell Posey will spend the vacation period with his family at their summer home at Watch Hill, R. I.

Dr. G. Oram Ring, of Philadelphia, has been appointed by Governor William C. Sproul a member of the Health Insurance Commission of Pennsylvania. Dr. Ring will spend the major portion of the summer at his camp at the Ponoco Lake Preserve.

Dr. L. Webster Fox, of Philadelphia, was the honor guest at a dinner given by a group of ophthalmologists at the Belgrade Lake Hotel, Maine, during the first week in June. Dr. Fox held an operative clinic during his visit at the Waterville Hospital. He and Mrs. Fox will spend the summer at San Francisco, Cal.

Dr. S. Lewis Ziegler, of Philadelphia, is spending the summer abroad. He will attend the Ophthalmic Congress at Oxford and will later attend the meeting to plan for an International Surgical Congress at Paris.

MISCELLANEOUS.

Illinois seems to be very active at present in handling the trachoma situation, which apparently has been on the spread.

A large number of trachoma cases have been found at Hammond, Ind. Precautions have been taken by the Indiana State Board of Health to prevent further spread of the disease.

A plague of blindness is sweeping the oasis towns of the Sahara Desert, eight of every ten children are now affected. So far the plague has not affected the adult Arab population to the same extent.

The National Committee for the Prevention of Blindness, 130 East Twenty-second Street, New York, is very much alive. Every ophthalmologist should receive their "News Letter," which is issued five times a year in the form of a pamphlet. It will be sent free to anyone who will make a request for it. This month the report of the Public Health Committee of the New York Academy of Medicine on wood alcohol poisoning is well worth reading.

In a paper published in the China Medical Journal on "Health Education in Schools of Higher Learning in China," written by Drs. Harvey J. Howard, W. G. Lennox and E. T. Hsieh, a program is proposed to combat blindness in China, where trachoma and gonorrhea are steadily increasing. The plan, altho developed to cover the whole field of public

health and personal hygiene, gives special emphasis to those subjects relating to the conservation of vision.

The committee appointed in 1919 by the Council of British Ophthalmologists to ascertain to what extent the increasing number of street accidents might be due to defective vision on the part of drivers of motor vehicles, have made their report. It is divided into five parts. Based upon the report of its committee the Council of British Ophthalmologists now recommends that before a license be granted the applicant should be required to show his ability to steer a motor car around corners and to avoid obstacles, and before a license is renewed the applicant should be required to sign a statement that since it was granted he has not suffered from any physical disability likely to interfere with his driving capacity. An important recommendation is that special sight test certificates of three grades be granted to applicants whose sight has been tested by ophthalmic surgeons appointed for the purpose. Grade A entitles the holder to drive any kind of a motor vehicle; grade B shows his capacity to drive any vehicle other than a motor bus or tram car, and grade C his ability to drive a tram car.

A new edition of F. P. Maynard's "Manual of Ophthalmic Operations," and a new book, "A Manual of Ophthalmic Practice," are now in press. Thacker-Spink & Co., Calcutta, India, and E. and S. Livingstone, Edinburgh, are the publishers.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colo.

DIAGNOSIS.

- Koby.** Ocular Microscopy with Gullstrand Lamp. Arch. d'Opt., v. 37, 1920, pp. 364-367.
- Koeppel, L.** The Nernst Slit Lamp and Corneal Microscope. (1 pl.) Graefes Arch. f. Ophth., v. 101, 1919-20, pp. 32-47.
- Meisling.** Test Chart for Young Children. Hospitalstidende, v. 63, 1920, p. 20.
- Lindahl, C.** Transillumination for Diagnosis of Tumor of Choroid. Uppsala Läk. för. Förhandl., v. 25, p. 1.

THERAPEUTICS.

- Mukai, H.** Subconjunctival Injection of Hypotonic Sodium Chlorid Solutions. Nippon Gank. Zasshi, July, 1919.
- Experiments on Intraocular Nutrition by Subcutaneous Injection of Pilocarpin. Nippon Gank. Zasshi, August, 1919.

OPERATIONS.

- Watanabe, M.** Result of Skin Graft to Conjunctiva. (2 ill.) Nippon Gank. Zasshi, Oct., 1919.

REFRACTION.

- Ashikaga.** Statistics of Myopia. Nippon Gank. Zasshi, Sept., 1919.
- Fuchs, E.** Accommodation and Presbyopia. España Oft., v. 5, 1920, p. 148.
- Gill, E. G.** Headaches from Standpoint of Ophthalmologist and Oto-Laryngologist. Med. Record, v. 98, 1920, p. 12.
- Gleichen, A. W.** Modern Optical Instruments. 376 p. London: H. M. Stationery Office.
- Hardwicke, W. W.** Sight Testing Made Easy. 4th Ed. London: J. and A. Churchill.
- Löhlein, W.** Headache and the Eyes. Deut. med. Woch., v. 46, 1920, pp. 29 and 87.
- Mazères, G.** Measurement of Ametropia with Convex Lenses. (1 ill.) Arch. d'Opt., v. 37, 1920, pp. 357-364.
- Smith, H. E.** Reflex Disturbances Due to Eyestrain. New York Med. Jour., June 26, 1920, p. 1108.
- Steinheil, H. A.** Applied Optics, and Computation of Optical Systems. London: Blackie and Son.

OCULAR MOVEMENTS.

- Cadwalader, W. B.** Bilateral Sympathetic Ophthalmoplegia in Lethargic Encephalitis. Arch. Neurol. and Psychiat., v. 4, 1920, p. 112.

- Dransart and Vanhoutte.** Paralysis of Right Externus after Cranial Injury. Arch. d'Opt., v. 37, 1920, p. 37.
- Gordon, A.** Ocular Symptoms in Cerebellar Lesions; Nystagmus. Arch. Neurol. and Psychiat., v. 4, 1920, p. 107.
- Pulleine, R.** Ophthalmoplegia. Med. Press, June, 1920, p. 440.
- Watari, S.** Treatment of Traumatic Paralysis of Inferior Rectus. Nippon Gank. Zasshi, Dec., 1919.
- Repeated Titles. **Cantonnet** (v. 3, p. 555). Arch. of Neurol. and Psychiat., v. 4, p. 99.

CONJUNCTIVA

- Bovero, A.** Cartilage of Plica or Third Lid in Mammals. Brazil Med., v. 24, 1920, p. 61.
- Brunetiere.** Pseudomembranous Actinomycosis of Conjunctiva. Arch. d'Opt., v. 37, 1920, p. 375.
- Chappé.** Conjunctivitis After Watching Cinema. Arch. d'Opt., v. 37, p. 378.
- Dabney, S. G.** Papilloma of Conjunctiva. Mississippi Valley Med. Jour., v. 27, 1920, p. 10.
- Darrieux.** Causes of Blindness Observed in 267 Infants Under Six Years. Arch. d'Opt., v. 37, 1920, p. 378.
- Gabrielides.** Etiology of Vernal Conjunctivitis. Arch. d'Opt., v. 37, p. 377.
- Ingersler, F.** Epidemic of Conjunctivitis in School Children. Bibliot. f. Laeger., v. 111, p. 528.
- Maderna, C.** Syphilitic Sclerosis of Conjunctiva. Med. Prat. Napoli, v. 5, pp. 13-17.
- Nicolle, C., Cuénod, H., and Blanc, G.** Trachoma Experiments on Rabbits. Arch. d'Opt., v. 37, p. 379.
- Oguchi, C.** Diagnosis of Ocular Secretions. Nippon Gank. Zasshi, Nov., 1919.
- Okamura, S.** Gonorrheal Ophthalmia. Nippon Gank. Zasshi, Dec., 1919.
- Sakaguchi, K.** Conjunctival Coccidium. Nippon Gank. Zasshi, Sept., 1919.

CORNEA AND SCLERA.

- Akazuka.** Experiments on Rabbits' Corneas with Various Medicaments. Nippon Gank. Zasshi, Oct., 1919.
- Bywater, H. H., and Gorst, P. E.** Corneoscleral Cyst. Lancet, 1920, 1, p. 319.
- Fusiwara, K.** Marginal Atrophy of Cornea (4 ill.) Nippon Gank. Zasshi, Oct., 1919.

- Hirschberg, J.** Statistics of Corneal Disease in America. Cent. f. p. Augenh., Oct., 1917, p. 141; Nov.-Dec., p. 161.
- Komoto.** Operative Treatment of Corneal Phlyctenulosis. Nippon Gank. Zasshi, Dec., 1919.
- Operation for Keratoconus. (2 ill.) Nippon Gank. Zasshi, Dec., 1919.
- Kuboki, H.** Histology of Corneal Degeneration. Nippon Gank. Zasshi, Aug., 1919.
- Lauber, H.** Plastic Operation on Cornea. Wien. med. Woch., v. 70, 1920, p. 107.
- Masuda, T.** Diffuse Superficial Keratitis. Nippon Gank. Zasshi, Dec., 1919.
- Nakamura, B., and Myake, Y.** Poisonous Effect of Methyl-violet on Cornea. Nippon Gank. Zasshi, Sept., 1919.
- Okasaki, G.** Intraocular Tension and Parenchymatous Keratitis. Nippon Gank. Zasshi, Nov., 1919.
- Olenchiu.** Use of Radium on Cornea of Japanese, and Refraction. Nippon Gank. Zasshi, Nov., 1919.
- Reiche, O. C.** Modern Treatment of Corneal Ulcers. Penn. Med. Jour., v. 23, 1920, p. 493.
- Rollet.** Ocular Zona. Arch. d'Opht., v. 37, 1920, pp. 322-326.
- Rönne, H.** Nonsyphilitic Parenchymatous Keratitis. Hospitalstidende, v. 63, p. 16.
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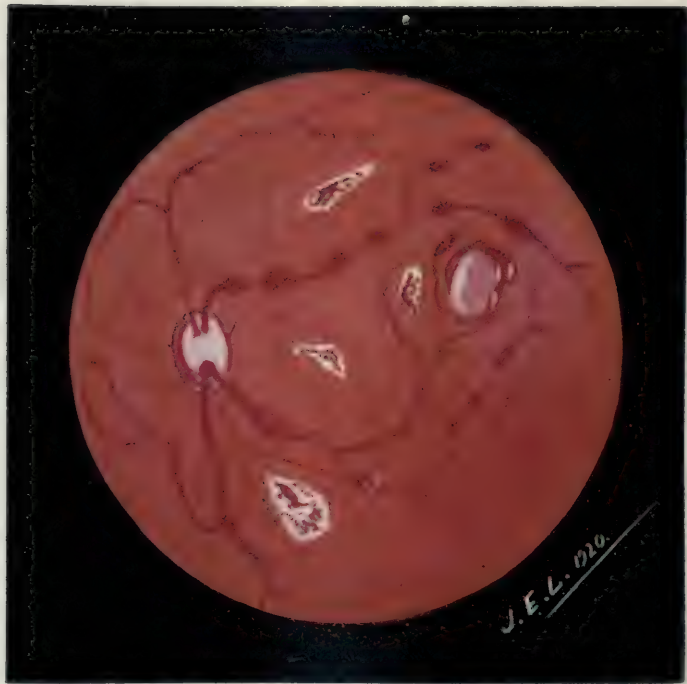
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MULTIPLE ANEURYSMS OF THE RETINAL ARTERIES. FERNANDEZ.

MULTIPLE ANEURISMS OF THE RETINAL ARTERIES.

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The character and early termination of the case here reported suggest the discussion of the prognostic significance of such lesions and their relation to arteriosclerosis.

Aneurisms of the retinal arteries, without being exceedingly rare are infrequent enough to justify describing a case when seen. In this case the most striking points were the shortness of the process and the fatal termination.

Without doubt in the etiology of these vascular lesions of the retina, arteriosclerosis plays an important part. Arteriosclerosis may affect the fundus in different ways, and in the retina it is characterized according to Roemer,¹ by the engorgement and tortuosity of the arteries at first, and later, by the thickening of their walls with attending reduction in their caliber, and consecutive endarteritis.

De Schweinitz² has shown the rarity of aneurismal cases, and believes that when they exist, they denote the co-existence of arteriosclerosis in other organs, especially in the brain. This emphasizes the serious way we considered our case, and this unfortunately was justified in a few weeks.

Sometimes arteriovenous aneurisms have been observed, which Fuchs has thought to be due to trauma. Von Hippel has seen some cases of the arteriovenous form which he believed might be due to tuberculosis, and Foster³ has called attention to the existence of some deposits of cholesterolin along the vessels, which are, he believes, appropriate places for the formation of thrombi. Leber⁴ has described a form of miliary aneurisms, in cases of retinitis, that consist in an extensive infiltration of the retina, and also with a group of multiple aneurisms. Knapp has remarked many of these cases have

occurred in young people, in some of which one has to believe in a tubercular origin.

The authors mentioned, as well as Axenfeld⁵ and Greeff⁶ believe the etiology to be arteriosclerosis in almost all the cases, and it must be so, because ocular arteriosclerosis is so frequent that in Posey and Spiller's work,⁷ the opinion of some authors has been quoted who believe that over fifty per cent of general arteriosclerosis has some kind of ocular localization.

The seriousness of the cases of aneurisms with hemorrhages has been remarked by Duane,⁸ in his splendid translation of Fuchs' work. He believes that in some cases they are "advanced signals" of cerebral hemorrhages. This is just the case in the subject of our observation.

It seems proper to review some of the most recently published cases, in which the prognosis for life has not been serious. Pringle⁹ describes the case of a young English soldier, 23 years old, without any ocular traumatism, who for the past 18 months complained of seeing cloudy with both eyes; and in whom the author found arterial aneurisms of both fundi. Jennings¹⁰ has also seen a case in a young man, 21 years old, with aneurisms in one eye, and Komoto¹¹ describes a case of a boy, 16 years old, who had been sick for three years, in whom he found besides aneurisms, some white zones in the neighborhood of the macula. In Jennings' case there were hemorrhagic zones, but not so in the other two cases.

It is without any doubt that these three cases have not the serious character that marked our case, chiefly on account of the age of the patients. But it is worth while to notice that Jennings saw his case again after three months, and found that some of the aneurisms had increased in size. This fact, together with the circumstance that there had occurred some previous retinal hemorrhages, does not impress one very favorably from the standpoint of the prognosis, and especially locally, because it is more than probable that the hemorrhagic processes will be repeated; and that they may, after some time, give rise to some glaucomatous condition, which in turn may require enucleation.

The prognosis then of these affections should not be serious concerning the life of the patient, when the subjects are young people, among whom general arteriosclerosis can not be expected to be so frequent as in old age. Concerning those cases in people over 40, altho Adams¹² has stated that with advanced age, the probabilities of life are better, this opinion could be applied to the whole group of vascular retinal troubles, but not especially to the hemorrhages due to ruptures of aneurisms that, from a logical point of view, should tend to increase in size.

Intraocular tension, or better still, intraocular arterial tension in its relation to general blood pressure, altho it might clear away some of the doubts, and even be of some use for the prognosis, can not be depended on entirely, because as Foster Moore¹³ has found, at times the pressure of the brachial artery is about 250 mm. of mercury and yet is below normal in the retinal vessels. On the whole, however, as Bailliant¹⁴ has been able to prove, there is a constant relation between both pressures.

CASE. Mr. R. B. C., 54 years old, consulted us on November 4, 1919, stating that for the past six weeks he had suffered a marked diminution in the vision of his left eye. This symptom had increased very much lately. The general appearance of the patient was that of a man much older, and one

could see very plainly the extreme tortuosity of the vessels along the temples, denoting an advanced state of arteriosclerosis.

There was nothing abnormal about his clinical history; the patient had not been a syphilitic nor a drinker; his habits were moderate and altho he smoked some cigars a day, his ocular lesions were found to be quite different from those described in tobacco amblyopia by our teacher Santos Fernandez.¹⁵

Vision in the left eye was limited to distinguishing fingers at two meters. In the right eye, vision was 2/3, but after correcting his hyperopia, reached to normal.

The ophthalmoscopic examination, with the May electric ophthalmoscope, showed a very curious and remarkable condition in the left fundus. One could see in the arterial vessels of the retina many aneurisms, more abundant in the upper branches. Near some of them, there were seen in the retina hemorrhagic zones of recent appearance, and in at least two different regions of the retinal field small atrophic zones, of different phases, but making it clear that the clinical findings were only different phases of the same process. In that way, the atrophic zones were the oldest lesions, and were due to the previous hemorrhages that had been absorbed. The new hemorrhages were the product of the ruptures of some of the aneurisms, that must have resembled before that stage, a chain or "rosary," of small links.

Arterial tension in this case was high, reaching 180 mm. Hg. Believing the case to be in a critical condition, we gave our opinion to his attending physician, who accompanied the patient to our office. We agreed to give him large doses of potassium iodid, besides other things indicated for his general arteriosclerosis, which we thought from the very first to be the most serious symptom. The patient went back to his home city, where he died from cerebral hemorrhage, on the 12th of December, 1919, forty days after consultation.

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RADIUM FOR CATARACT.

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The influence of radium on lens opacities as studied in the Department of Ophthalmology in the University of California is reported in this paper, with an account of work previously reported in this direction by other observers. The results obtained are stated in tabular form. The paper was read before the California State Medical Society and is published here thru the courtesy of the Society and its Journal.

Various procedures have been attempted and a great deal of time and effort expended in an attempt to either absorb or check the progress of lenticular opacities. Numerous chemical reagents have been experimented with, but the results were discouraging and the treatment too severe and painful without sufficient improvement to warrant their continuance.

Cohen and Levin, of New York, in the early part of 1918 applied radium therapy systematically to cataracts. They reported an improvement in 87% of their cases. Following their pre-sessional report, in April, 1919, we began radium therapy especially in cataracts, and this brochure expresses our tabulated results.

For ophthalmologists who possibly are not fully informed as to the known physics and therapeutic properties of radium, a brief resume will be given.

Radium emits "alpha," "beta" and "gamma" rays. Each type shows a relatively wide variability in velocity. The alpha and beta rays are particles of matter, while the gamma are sim-

ilar to light waves, and those possessing shorter wave lengths are more penetrating than those possessing longer ones. In X-ray terminology the rays of shorter wave length would be classed as hard and the longer ones as soft.

The gamma rays are the more penetrating and concern us in therapy, while the alpha and beta should be excluded, altho it is probable that all three have a therapeutic effect, which consists in tissue destruction. The alpha rays are atoms of helium and are arrested by a small amount of screening, for example, the varnish of the glazed plaque practically rules all of them out. The beta rays are negatively charged electrons and, as they have an irritating effect upon the superficial structures, are excluded thru the proper screening. The gamma rays are similar to light waves.

The selective action of radium depends upon the fact that pathologic structures are more susceptible to reaction than are the normal tissues. For this reason, in treating a lesion that lies below the surface, it is neces-

sary to eliminate the elements which would affect the superficial layers without reaching the pathologic condition. This is the more imperative as the number of the penetrating gamma rays is much smaller than the number of beta rays. Due to diffusion the intensity of radiation varies, roughly speaking, as the square of the distance; thus by increasing the distance between an applicator and the lesion a more uniform radiation is obtained into the deeper lesion. A silver screen 0.5 mm. thick screens out all but 2% of the most penetrating beta rays and leaves practically all the gamma radiation. One mm. of lead screens out all of the beta as well as a part of the less penetrating gamma rays.

Radium has been used in ophthalmology for a number of years. At first it was applied to tumors of the lids and orbit. Somewhat later it was used in trachoma, then vernal catarrh, corneal ulcers, corneal scars, affections of the lids and other pathologic conditions. As a whole, the reports were encouraging altho some few men were skeptical as to its therapeutic value. The methods were for the most part crude; no special precautions were taken to screen the harmful rays. No definite system of dosage was used.

Lawson and Davidson¹ in 1910 used radium on a variety of cases. In their report their method is carefully described. The eye was cocaineized and the radium which was contained in sealed glass tubes, permitting only the passage of beta and gamma rays, was applied directly to the affected part. The fingers of the operator were protected by enveloping first that part of the tube not required, then the fingers in a thick continuous wrapping of lead foil. The process was tedious. They used 20 milligrams of the element, with exposures from five minutes to half an hour. The frequency of exposure was governed by the progress of the condition. They reported on approximately 80 cases and noted no ill effects from the use of radium.

Koster² used a glass tube filled with radium which he placed, unprotected in any way, directly to the bulbar con-

junctiva. The same amount placed in the skin would have caused a skin reaction, yet he noted no scleral burns. He used 2 milligrams of radium in his work and treated a variety of cases. His report on cataracts was negative altho he stated that in the star form in the anterior cortex, the opacities disappeared after five, one hour a week, sittings.

Cohen and Levin³ in 1919 described their technic as follows: The radium was covered with brass, photographic paper and gauze and placed over the lid. The distance between the radium substance and the eyelid was about 2 cm. They used 2—3 mm. of brass screening and 2 cm. of gauze. The exposures lasted from one to two hours and were repeated twice a week during the first five weeks and then once a week.

The purpose of this paper is to describe the technic and give our results in thirty-one cases. Our method of application differs from the published description and has been the result of gradual development and the dosage somewhat arbitrary.

In the use of screens and distance, we have been guided by the experiences of the Department of Dermatology of the University of California.⁴

We are using 9.95 mg. of radium element in the form of radium barium sulphat in a circular gold plated glazed plaque over an area of 50.26 sq. mm. The apparatus consists of a specially designed silver cup to facilitate handling the radium. The bottom of this cup is made of a piece of silver 0.5 mm. in thickness and screens out practically all but the gamma rays. The cup is embedded in a block of vulcanite, the bottom of which is 0.6 cm. from the silver cup. The vulcanite is used as an easy method of obtaining a certain fixed distance and thus has the advantage over gauze pads. The container is now applied on a lead plate 1 mm. in thickness. This plate is shaped to cover the eyebrows and lashes and extends over the cheek a short distance. Directly under the radium is a hole 8 mm. in diameter (the diameter of the radium plaque). The lead plate

acts as an additional safeguard against alopecia of the eyebrows and lashes and gives a convenient method of applying the radium. There is some doubt as to the harm done by secondary rays, which in this apparatus would be given off by the lead plate, and to prevent the possibility of injury from these rays, a piece of rubber dam is placed, as an additional safeguard, below the lead plate.

The patient is placed in the prone position and the lids of the eye under treatment held closed by applying a small strip of surgeons' isinglass plaster. A small gauze sponge is placed on the eye to prevent the apparatus from coming in direct contact with the patient. Over this gauze sponge the radium apparatus is placed and held in position by two tapes and two small pieces of adhesive plaster. The patient is told to fix the ceiling with the uncovered eye, thus bringing the lens of the eye under treatment more directly under the radium. In this method, the radium is about 1.2 cm. from the eye.

The matter of dosage is rather an uncertain one, varying with each type of radium applicator. A milligram hour is the exposure to one milligram of radium for one hour. The term gives a method of dosage for a given plaque of radium if the conditions of screening and distance are included. In most of our cases, we have been giving 10 milligram hours twice a week for four weeks and then once weekly until the process is stationary. Following this, one exposure is given monthly. Experimentally it has been shown that the normal tissues of the eye are more resistant to the radium than the tissues of the skin, therefore, the lid gives a valuable indication against an overdosage, as a reaction would take place here before any injury could be done to the structures of the globe. In one of the earlier cases there was a mild reaction when less screening was used. The erythema of the lid passed away within a few days. No other reactions have been observed.

A radium emanation plant has been installed at the University Hospital

and we are now using radium emanations in the treatment of a series of cases. The tubes are screened with silver so that the silver cup is omitted in the application; with this exception the method remains the same. The length of exposure varies according to the strength of the tube. The dosage given is equivalent to 10 milligram hours. For example, if a tube checks up as equivalent to 20 milligram gamma radiation, the time of exposure would be for half an hour. It is too early as yet to give the results with this method.

Before starting the radium therapy, the vision and ophthalmoscopic findings were carefully noted. Every month an examination was again made and the above recorded. When the vision remained stationary for one month, an application of 10 milligram hours every four weeks was found to hold the improvement. The chart shows graphically the results obtained while but a few of the cases will be described in detail.

CASE NO. I.

F. S., Female, age 58.

Complains that distance vision has gradually been failing. Change of glasses no help. External strabismus L. since fire, 1906. R. V. 0.2, L. V. 0.1 blurred. *Examination:* Incipient cataracts in both eyes. Fundi negative. Patient was given 190 milligram hours of radium at weekly intervals for a period of 6 months. At the end of that time vision was R. V. 0.6 vision. Vision has gone from 0.2 to 0.6.

CASE NO. II.

N. L., Female, age 32.

Examination showed perinuclear cataracts in both eyes. Fundi negative. R. V. 0.5; L. V. 0.5. Patient was given 60 milligram hours to each eye from Feb. 18, 1920 to March 25, 1920. At the end of that time R. V. was 0.8; L. V. 1.0. Vision has gone from 0.5 to 0.8 in R. and from 0.5 to 1.0 in L.

CASE NO. III.

A. S., Male, age 58.

Gradual failing of vision in both eyes, most marked in R., for last two

years. Examination showed an immature cataract in R. and an incipient cataract of the cortical type in the left eye. Fundus negative.

The patient was given 200 milligram hours of radium to left eye at weekly intervals over a period of 6 months beginning August 8, 1919.

Aug. 8, 1919, L. V. 0.5.

Oct. 19, 1919, L. V. 1.0.

Dec. 11, 1919, L. V. 1.2—4.

Reported back April, 1920, R. V. 1.2—3.

During this time R. V. became worse, going from 0.1 to fingers at 4 feet. No radium had been applied to right eye.

The vision of the left eye improved from 0.5 to 1.2—3.

CASE NO. IV.

N. H., Female, age 50.

Early incipient cataracts of nuclear type discovered during routine examination. Fundi negative. R. V. w. gl. 1.0; L. V. w. gl. 1.0.

Patient was given 50 milligram hours to R. and 90 milligram hours to L. From July 12, 1919, to Nov. 26, 1919, R. V. 1.2 at that time, L. V. 1.2. This case shows that very early cataracts will disappear entirely. To date (5 months later) there is no evidence of recurrence.

CASE NO. V.

M. P., Female, age 64.

Gradual failing of vision for past two years. Glasses no help. Examination: R. incipient cataract of the cortical type. Fundus negative. L. immature cataract.

R. V. w. gl. 0.5. Patient was given 65 milligram hours from July 12, 1919, to Nov. 13, 1919. R. V. at that time 0.8, showing an increase of 0.3. The opacities have thinned out a good deal.

Of the thirty-one patients under observation, 84.3% showed a change for the better, ranging from an improvement of 3—4 letters on the test chart to

a complete disappearance of the process. In the cases that showed a marked improvement, the opacities were very definitely thinned out; one of these, a very early nuclear cataract, disappeared entirely leaving no trace of the opacities. In no instance where there has been an improvement has there been any retrogression to date, however, the time of observation has been too short to determine whether or not the cataract will eventually go on to maturity.

Twenty-one of the cases treated were private, the remaining ten being clinic patients. The percentage of improvements was much higher in the private cases. This is explained by the fact that due to the difficulty of obtaining the radium for the Out-Patient Department, these individuals did not receive the exposures systematically in many instances. This emphasizes the necessity of frequent systematic treatments in the beginning.

Radium is of proven value in the treatment of incipient cataracts. Our findings correspond sufficiently well with those of Levin and Cohen to indicate that it is not merely a coincidence but that actual results are obtained. Altho the vision cannot be brought up to normal in many individuals, the ultimate outcome is superior to an aphakic eye such as is obtained by surgery and does not subject the patient to the surgical risk of such a procedure.

CONCLUSIONS.

1. The application of radium does no injury to the normal structures of the eye.
2. It apparently has a selective action upon the lens.
3. Radium improved the vision in 84.3% of our cases.
4. A consistent technic and known dosage seems advisable.
5. Frequent treatments are necessary in the beginning.

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4. Drs. Howard Morrow and Lawrence Taussig.

TABLE OF CASES

Class	NAME	Age	Amt. Radium Mil.-hrs.	Dates		Vision		Remarks
						Before	After	
P.	Mrs. L. L.	58	R. 80	11-6-19	4-5-20	.3	.6	Improved
			L. 40	1-4-19	4-5-20	.5	.8	
P.	Mrs. A. B.	50	R. 50	3-1-20	4-12-20	wgl .1	wgl .1	
			L. 50	3-1-20	4-12-20	wgl .4	wgl .6	Improved
P.	Mr. J. B.	66	R. 90	1-15-20	4-1-20	.3	.5	Improved
P.	A. H. B.	74	R. 80	3-10-20	4-8-20	.2	.4	Improved
P.	Mrs. M. G.	80	R. 80	2-11-20	4-7-20	.1	.2	Improved
P.	Mrs. F. D.	56	R. 70	7-17-19	12-18-19	.3	.6	Improved
			L. 80	7-17-19	12-18-19	.4	.6	
P.	Mrs. B.	50	L. 50	11-7-19	12-11	.8	1.1?	Improved
P.	Miss M. B.	81	R. 40	7-10-19	9-18-19	fingers at 10 ft.	.2?	Improved
P.	Mrs. A. L.	53	R. 100	7-24-19	1-22-19	1.0?	1.1	Improved
			L. 100	7-24-19	1-22-20	1.0?	1.1	
P.	Mrs. N. H.	50	R. 50	7-12-19	11-26-19	1.0	1.1	Improved
			L. 90	7-12-19	11-26-19	1.0	1.1	
P.	Dr. M. G.	53	R. 90	8-1-19	3-3-20	.5	.5	Not Improved
			L. 90	8-1-19	3-3-20	.5	.5	
P.	Mrs. D.	60	R. 40	1-14-20	3-11-20	.4	.5	Improved
			L. 40	1-14-20	3-11-20	.4	.5	
P.	Mrs. M. P.	64	R. 65	7-12	11-13	wgl .5	wgl .8	Improved
P.	Mrs. N. L.	32	R. 60	2-18-20	3-25-20	wgl .5	wgl .8	Improved
			L. 60	2-18-20	3-25-20	wgl .5	wgl 1.0?	
P.	J. P. L.	53	L. 80	1-30-20	3-18	wgl 1. ?	wgl 1.	Slight Improvement
P.	Mrs. B. V.	87	R. 20	10-9-19	10-30-19	02	Same	No Improvement
			L. 20	10-9-19	10-30-19	fingers 6 ft.		
P.	Mrs. F. T.	70	L. 80	7-11-19	3-24-20	wgl .1?	wgl .2-1	Improved
P.	Mr. P. A.	63	R. 120	2-2-20	4-13-20	.1?	.2?	Improved
P.	Mr. G. K.	60	R. 50	2-18-20	3-27-20	wgl .3?	wgl .3	Slight Improvement
			L. 50	2-18-20	3-27-20	wgl .5?	wgl .5	
P.	Mrs. F. S.	58	R. 190	10-16-19	4-12-20	wgl .2	wgl .6	Improved
P.	Mr. F. C. F.	23	R. 30	10-23-19	12-11-19	.6	.8	Improved
			L. 30	10-23-19	12-11-19	.6	.8	
C.	Mr. A. A.	63	R. 50	1-26-20	3-9-20	.3	.4	Improved
C.	Mrs. F. C.	62	R. 65	11-10-19	2-17-20	fingers 10 ft.	fingers 16 ft.	Slight Improvement
C.	Mr. K. C.	56	L. 45	2-12-20	3-19-20	.5-2	.5-1	Slight Improvement
C.	Mrs. E. G.	30	R. 110	8-29-19	3-12-20	.2	.5-2	Improved
			L. 110	8-29-19	3-12-20	.1	.1	Not Improved
C.	Mrs. M. H.	65	L. 45	1-30-20	3-8-20	.5-1	.5-2	Slight Decrease
C.	Mr. G. J.	64	L. 55	1-2-20	3-11-20	.6-2	.6-1	Slightly Improved
C.	Mr. C. R.	51	R. 30	1-29-20	3-15-20	.2	.2	No Improvement
C.	Mr. A. S.	58	L. 200	8-19-19	3-11-20	.5	1.2-3	Improved
C.	Mrs. B. A.	55	R. 25	1-28-20	3-10-20	.1	.2	Slightly Improved
			L. 25	1-28-20	3-10-20	.1?	.2?	
C.	Mr. T. H.	64	L. 30	8-21-19	8-28-19	.2	.1	Worse

P—Private.

C—Clinic.

THREE UNUSUAL CASES OF FOREIGN BODIES IN AND ABOUT THE EYEBALL.

FREDERICK T. TOOKE,

MONTREAL, CANADA.

This paper reports three cases of foreign bodies long retained in or near the eye, and illustrates the importance of careful examination for the possible presence of such foreign bodies and the benefits to be secured by their removal even in eyes regarded as lost. Read before the American Ophthalmological Society, June 16th, 1920.

In the prosecution of any war of modern times the sciences have derived not only a spontaneous or immediate inspiration, but also a subsequent recorded account of the achievement of premeditated as well as of unpremeditated endeavor. In no branch is this more true than in medicine: for war produces certain problems almost unknown in times of peace, the solutions of which have their own peculiar subsequent application and consideration in civil life. Besides creating fields of special investigation, war between civilized nations has the peculiar though possibly remote benefit of having all its findings definitely and systematically recorded. The findings of the Army Medical Corps of all the forces engaged in the recent European campaign should, thru a more or less comparable system, prompted and stimulated by most unusual conditions, provide an abundance of classified information almost unobtainable under the ordinary conditions of civil life.

In referring to the subject of foreign bodies in and about the eyeball, doubtless a great deal of valuable information will be supplied when all material is gathered together from the various ophthalmic units of the allied forces. I am bringing forward the following three cases, not with the presumption of exhausting a very extensive subject, but rather to place on record instances which seem to me to deserve special recognition and consideration. Two of the cases were under my care in the Military Wards of the Royal Victoria Hospital, Montreal, while the third case was a civilian in the general ophthalmic ward of the same institution.

CASES.

CASE 1. G. D. Canadian, age 35, a man of large physique, enlisted for

Overseas service in the 87th Battalion. After the usual period of training he was sent to France where he took part in several engagements. In the last one he had been selected as a bomber, and was rushing a German dugout. Thru excitement or anxiety, a hand grenade burst before he had time to hurl it from him. The right hand and forearm were shattered, the right eye torn to shreds, and the left eye blinded. The remains of the right eye were enucleated at a base hospital, the day he was injured. A large piece of steel was also removed from the left eye.

He was sent to England where he received treatment in two hospitals, an enucleation of the remaining eye being at one time considered on account of pain and inflammation. The patient was ultimately transferred to the Canadian Eye Hospital at Westcliffe, where the recorded vision was shadows only. No treatment being deemed advisable, he was sent to St. Dunstan's School for blinded soldiers, under Sir Arthur Pearson, where he remained for six months. He was ultimately returned to Canada two years after the accident as the first of a nucleus for an annex of that institution in our country. In the course of transit he was held over at the Royal Victoria Hospital where he came under my service.

The lids and conjunctivae were normal, the movements of the eyeball were free while there were a few powder grains embedded in the cornea. There was a scar of the cornea at the limbus at the nasal side above, with an underlying iridodialysis. This was doubtless the point where the foreign body entered and where it was subsequently extracted. The anterior chamber was of normal depth, while

the pupil was completely occupied by cortical and capsular remains, into which the iris had been dragged down by dense bands of postinflammatory tissue. One of these bands seemed to be particularly dense extending downward from the upper nasal quadrant. The eye presented a picture of what must have formerly been an intense traumatic iridocyclitis. Indeed, the patient had complained of black spots floating before his vision, but recently he had observed that this had not been as coarse as formerly. Tension of the eyeball was not soft, and projection of light was active in all directions. An X-ray photograph was made which showed about 16 small foreign bodies varying from 2 to 6 mm., within the orbit. About 6 of these seemed to be particularly suspicious, and after localization were decided to be extraocular.

After a culture of the conjunctiva was taken a subconjunctival needling was done in a V shape above, cutting thru the band of inflammatory tissue as well as thru the remains of the lens and capsule. There was remarkably little reaction following the operation. Two days after operation he was able to recognize my features, with a +10. D. lens. Four days later he saw his wife for the first time, he having married her after he had become blind. One week later he could tell the time by the wrist watch. Today, one year after his operation he sees 6/12+ and Jaeger 2. He is able to distinguish people on the street, attends the theatre with pleasure and is following the vocation of salesman.

CASE 2. C. G., Canadian, sturdy and well developed, enlisted in the 22nd Battalion early in the war. He saw active service at Ypres, St. Loye, Camelle, and Descabuche, finally being wounded at Courcellette, in September, 1916. Regarding his eye, all that he at first experienced was a slight stinging sensation without any actual pain; and he carried on until enforced by subsequent wounds to be sent to the rear. He was treated at Boulogne and subsequently transferred to England, where six pieces of shrapnel were re-

moved from the side of the neck. Altho the injured eye was blind, little attention seems to have been paid to it as it was neither inflamed or painful. He was returned to Canada unfit for further military duty and was subsequently admitted to the Military wards of the Royal Victoria Hospital, as the eye had become painful, two years after his being wounded.

The lids and conjunctiva were normal, manifesting no evidence of any measurable wound. There was some circumcorneal injection and the eye was slightly tender on pressure. The anterior chamber was abolished, the iris lying directly against the inner layer of the cornea. The pupil which was not dilated was inactive to light, while the lens was gray or cataractous. Tension registered 60 mg. of Hg. with the Schiötz tonometer. Vision was reduced to bare light perception, while light projection was problematic. An X-ray photograph was taken showing a small foreign body 16 mm. back, 8 mm. to the nasal side and 5 mm. below.

Under local anesthesia the patient was subjected to the Haab magnet, but under a moderate current failed to respond. On applying the full current no further encouragement was met with. However, by making and breaking the current at full strength the piece of steel was finally jerked thru the cataractous lens substance and could be noticed jammed up against the back of the iris above. It was impossible to draw it down, owing to the abolition of the anterior and posterior chambers thru the glaucomatous process. With a specially selected Graefe knife, an unusually narrow one, I managed to enter the chamber engaging the iris at the same time in a satisfactory corneal section. Lancaster's hand magnet was then introduced into the eye and a small foreign body was extracted with the greatest ease. It measured 1 by 3 mm. The ididectomy having already been performed at the time of the corneal incision, the soft lens matter was then removed with subsequent irrigation resulting in a perfectly clear pupil. The eye cleared up with unusually little reaction, a nor-

mal anterior chamber was soon formed and tension with the use of atropin was normal. One month after operation a clear view could be had of the fundus which showed a moderate degree of cupping in the disc with dipping of the veins. His subsequent visual acuity was 6/12 and tension 23 mm.

CASE 3. M. L. D., an American residing in the northern part of New York State consulted me for pain and redness in the left eye, which he first noticed two weeks prior to his visit. He would observe the symptoms generally when getting up in the morning when the redness seemed to be associated with a dull pain at the back of the eyeball. He consulted an eye specialist at home who recommended the use of atropin drops, but he otherwise paid little attention to the condition. Bright lights troubled him at times, but there was no lacrimation. There was a slight degree of smarting of the healthy eye.

The history of the case was that when going to school, fourteen years earlier, he had been struck by a small fragment of screw at which he had been chopping. The sight was lost almost at once. He had periodic attacks of pain at the back of the eye, about once a year since the date of the accident. The eye was never red.

On examination the eye manifested considerable lacrimation but no photophobia. There was marked circumcorneal injection. One could see a definite small scar in the cornea about the middle of the pupillary area. An iridodonesis was present, with an anterior chamber of moderate depth. There was no sign of keratitis punctata, nor evidence of any kind of secretion in the anterior chamber. The pupil was regular, the vitreous was filled with coarse opacities, probably broken down particles of lens, while the optic disc could be clearly seen, apparently deeply cupped. This condition appeared to be physiologic, as there was no sign of a vessel emerging from the center of the nervehead. Tension was normal, and no tenderness could be elicited over the ciliary body. Vision consisted

in counting figures at 1 foot, while the field of vision could not be estimated.

The man was sent to the Royal Victoria Hospital to have an X-ray photograph taken, and he presented himself for further examination the following morning. On this occasion, much to my surprise, a definite foreign body could be distinctly made out in the lower filtration angle, moving about in the aqueous with the change in position of the head. He told me that he had been in the habit of sleeping on his chest with his face buried in the pillow, which fact must have accounted for the foreign body working thru the pupil during the night. It was certainly not in the anterior chamber the day previous. I instilled eserine into the eye, reducing the pupil to the smallest possible dimension, referring him back to the hospital in the meantime with instructions not to lie down.

The same afternoon I operated with the patient in the semierect position, making an incision at the limbus below directly over the foreign body. I inserted the fine tip of a Lancaster hand magnet into the chamber, expecting the extraction to be an unusually easy one. But the reverse was the case. As soon as the tip of the magnet came in contact with the foreign body, when the current was turned on the foreign body spun about like a top. This behaviour was later explained by the splinter being composed in the main of a tiny central core of actual steel, the bulk of it consisting of rust. It was finally removed by a pair of iris forceps after breaking into two parts. Recovery was uneventful. On his return to Montreal a year later the eye was quiet, there was no iritis, a complete separation of the retina was present which doubtless existed prior to operation, and tension was normal. The right eye was healthy in all particulars.

In the Transaction of the Ophthalmological Society of the United Kingdom for 1916, there appeared a very complete and extensive discussion on the subject of foreign bodies in the eye and orbit, with special reference to prognosis and treatment. Altho the subject was treated in the greatest de-

tail the various speakers confessed that their experience had, up to that time been confined to accidents occurring during civil life. Practically all were agreed that heretofore opportunities had not been afforded them of making first hand observations on military cases. The exigencies of circumstances frequently caused, if not actually rendered the enucleation of an eyeball imperative before a patient could be returned to England.

The error of the too hasty enucleation of an eyeball, even tho blinded, was pointed out from the results of subsequent examinations at ophthalmic centers, when a foreign body would be found embedded in the deep tissues of the orbit after having penetrated the globe. Case 1 may be a possible example. This criticism is, however, in my experience sometimes unfair; for at Halifax I frequently found eyes completely destroyed by retained glass with additional fragments within the orbit. Besides, one must be charitable in our criticism of enucleations, remembering always a very much damaged eye on the one hand and the absence of an expert radiographer in the average field hospital. I have had men return under my care to Canada in this condition, with a presenting foreign body in the orbit, the eye having already been removed for reasons which I have just attempted to explain.

The contributors to this symposium were agreed that industrial and military experiences were quite dissimilar in this respect, in that the former class of cases consisted as a rule of a solitary foreign body within the eye or orbit. On the other hand in military cases, as in my cases 1 and 2, only too often there may have been one or more than one foreign body in the eyeball, with innumerable other small particles closely associated with it in the orbit or about the lids and face. I would refer you to Mr. Gray Clegg's series of 830 industrial cases reported and tabulated in detail from the Royal Eye Hospital, Manchester, as particularly interesting and instructive.

One conclusion arrived at, and one

that can be applied to cases 2 and 3 in the present paper, is that if a small foreign body has not penetrated the danger zone it may frequently remain within the eyeball for years without creating sympathetic disturbance. Sympathetic irritation, according to Parsons, is too often the result of meddlesome interference in attempting to remove a foreign body, rather than the disturbance caused by that foreign body itself. Mr. Collins reported one case that began to give trouble only after thirteen years. My last case went thirteen years before he felt any acute disturbance in the eyeball and still retained his eye. A great deal of sensible advice was given regarding the choice of a magnet. The huge Haab instrument, tho often of the greatest value may do irreparable damage, the fact of using such force being frequently responsible for continued irritation resulting in the subsequent enucleation of an eyeball. One speaker referred to an instance exactly comparable to case 1, but he dreaded the responsibility of a needling, fearing the excitement of an iridocyclitis in a man with only one eye.

Another point on which many were agreed was, that if conditions warranted it, a magnet extraction should be attempted as early as possible after the accident, the localization of the foreign body being of secondary importance to the possibility of removing the steel, perhaps thru the original wound before adhesions had formed around the foreign body. Mr. Hill Griffith preferred when possible to draw the foreign body thru the circumlental space and to extract it thru the anterior chamber. He considered that a scleral section courted a separation of the retina.

But much water has flowed under the bridge since these views were expressed, at least from a point of view of military experience; and doubtless in the course of time other cases will be reported by various army oculists, in many respects similar to those which I have had the privilege of presenting before this Society.

RECURRENT RETINAL HEMORRHAGES.

WILLIAM ZENTMAYER, M.D.

PHILADELPHIA.

This paper states the characteristics of this symptom complex, gives the writer's own experience of it, four cases, and discusses the different views held with regard to its etiology and pathology, diagnosis and treatment, and advances the view that disturbance of function of the endocrin organs is an etiologic factor. Read by invitation before the New England Ophthalmological Society, April 20th, 1920.

The disease originally described by v. Graefe, to which Eales gave the name "Recurrent Retinal Hemorrhages," is one of unusual interest, one might say fascination, because of its distressing features; affecting as it usually does, young men who have previously been in fair health, the attack coming on with alarming suddenness and running a long course with alternating periods of hopefulness and depression, both to the patient and physician, and terminating only too frequently in partial or total blindness. It has seemed worth while to reread the original papers by Eales that we may have a clear conception of the clinical features of the cases which he recognized as a clinical entity.

Too often latter-day descriptions have been shorn of important and sometimes, essential features, as each succeeding systematic writer has used as his source of information an abstract quoted by some previous compiler. An excellent illustration of how far afield writers of books may thus be lead from the original descriptions and in the perpetuation of an error is the recent exposure that there is not one American text book and only one or two in any language, but have an entirely erroneous description of Gunn's dots. In consulting the literature of the disease under consideration it has seemed to me that cases have been described under this head that differ in many of the striking particulars of Eales disease; and the conclusion is forced upon one that, tho they may be allied conditions, some underlying factor is either different or wanting. The cases which I have to report conform in their essential details to the cases upon which Eales built up the symptom complex with which his name is linked.

The features of the disease as described by Eales are taken from a study of seven cases. All the patients were males ranging in age from 14 to 20 years. They were dyspeptic, low spirited, wanting in energy and complained of frontal headache, expistaxis and constipation. The pulse rate was habitually under 60, altho in the interval of ocular and nasal hemorrhage it might rise to 72. The number and proportion of blood cells was normal. The exciting causes of the intraocular bleeding were recumbent posture, stooping, coughing and laughing. In three of the cases the fathers had episistaxis. In all of this group the left eye was primarily and chiefly affected. When first seen the vitreous was opaque from hemorrhage and the fundus was either invisible or visible thruout a small portion of the upper part of the periphery, and here extravasated blood was found in the retina. There was often a rapid diminution of the opacity of the vitreous followed by a sudden recurrence of the opacity from fresh hemorrhage after a few weeks or months. Many such recurrences took place. In each case vision seemed to suffer only in proportion to the opacity of the vitreous. Between the attacks it sometimes recovered its normal acuity altho vitreous shreds were discoverable. The vessels in each eye were large and tortuous, especially the veins which were also remarkably dark colored. The hemorrhages were confined almost entirely to the extreme periphery of the retina. The extravasations were almost always large and round, and bleeding could often be seen to proceed from venous radicles. In one case glaucoma supervened. He also notes the tendency for the formation of vascular membranes in the vitreous.

Many cases have been reported in literature since the appearance of this admirable contribution, and so far as the ocular findings and clinical course are concerned, little has been taken from or added to it. The female sex has been found not to be immune and probably too much stress was laid on the dominant participation of the left eye; altho in my experience that eye has suffered the more.

CASES.

CASE 1. A. B. First seen Feb., 1917. Male age 18 years. History of sudden impairment of vision in L. E., 10 months ago. Cleared up in a month's time. For ten years previous to this he had noticed a streak in front of this eye. Present trouble about 6 weeks, in L. E. and a few days in R. E. No serious illness. Measles and scarlet fever. Does not use tobacco or alcohol. Parents living and well. Two sisters well. Feels well. No epistaxis. Physical examination by Dr. M. H. Fussell. Large fat individual. Pulse 82. B. P. 140—75. No enlargement of thyroid. Blood—hemoglobin 78% R. B. C. 4,020,000; W. B. C. 9000; Polys. 67%, Lymphs 28%; Large 5%. Blood nitrogen .016 per litre. Tuberculin, v. Pirquet positive. Wassermann negative. Coagulation from normal, to slow. Phys. Exam. Other respects normal. While in hospital pulse ranged from 68 to 89. T. 99—101°. When first seen Feb., 1917, V. R. E. 5/7.5; L. E. Hand movements at 1/3 M. Vitreous so opaque no fundus reflex. R. E. Vitreous filled with fine opacities. In the region of the ora serrata there was a zone of hemorrhages in the retina. The inferior retinal vein was greatly distended.

Field of V. R. E. Two rather deep reëntering angles above. L. E. Entire upper field gone.

By Sept., 1917, V. in L. E. nearly normal; R. E. 5/50. Beginning formation of new tissue over temporal border of disc. In July, 1918, V. L. E. 5/5; R. E. unchanged. By Oct. V. L. E. 6/6; R. E. 5/9. The proliferating tissue has greatly increased. Vision continued to improve in L. E. and when last tested March, 1919=5/4; R.

E. 5/20. (Patient reported April 17, 1920.) V. R. E. counts fingers. L. E. 6/6. Mass of proliferation tissue and probable detached retina. Has had one attack of nose bleed. Present weight nearly 200 lbs.

CASE 2. E. B., female, married, age 33 years. (Patient of Dr. W. T. Shoemaker.) First seen April, 1917. Father and mother living and well. Five brothers and sisters. No history of tuberculosis. Has been married 5 years. One child living and well. One miscarriage. She had had the usual diseases of childhood.

Phys. Exam. Well nourished. Wassermann negative. X-ray of sinuses chest and teeth, negative. Urinalysis negative. No record of tuberculin test.

Blood Exam. Hem. 74%, R. B. C. 3,740,000. W. B. C. 50600; Polys, 50%, Lymphs. 42%. Coag. time 12 min. B. P 115—65.

Eye trouble dates from Aug., 1914, when the left eye was hit by a tennis ball. Some time after this vision of left eye was lost but was later recovered. This again occurred but recovery was not so complete. Recently again lost it. Thinks R. E. now failing.

When first seen by Dr. Z. May, 1917, V. R. E. 20/50; L. E. 1/100. In R. E. marked proliferating retinitis. L. E. Vitreous filled with blood. While under treatment vision of R. E. fluctuated greatly, but there was practically no change in that of L. E. up to the time of using fibrolysin in Jan., 1918, at which date it was reduced to 1. p. After one month's use of fibrolysin it again=1/100. Indirectly it is learned that at the present time the patient has had relapses in R. E. which have reduced the vision.

CASE 3. A. S., male, age 23 years. Seen in consultation with Dr. P. H. Kleinhans, of Bethlehem, Pa., April, 1918. Vision failing in R. E. since Feb., in L. E. for few days. Has had no serious illness. Tuberculosis on his mother's side. Parents living and well. Four sisters and 2 brothers living and well. One sister died of spinal meningitis, at 20 months and one of "throat consumption" at 5 months. No epistaxis. Constipated. Is gaining weight (140 lbs.).

v. Pirquet and Wassermann negative. The blood was normal except for a slight simple anemia. Coag. time of blood 5 minutes. Physical examination negative.

V. R. E.=1/60, L. E. 15/30. In R. E. central and lower part of vitreous is so dense that no fundus details are possible, elsewhere a red reflex is obtained; and to the nasal side a proliferating mass is visible. L. E. Several retinal hemorrhages in peripapillary region. In July, 1918, V. each eye about normal. Sept., 1919, V. R. E. 20/70; L. E. 1/200 eccentric. R. E. showed large sheets of hyperplastic tissue. L. E. Vitreous almost filled with blood.

At this time a subcutaneous tuberculin test was made and proved negative. April, 1920, Dr. Kleinhans reports that the patient now weighs 165 lbs. (height about 5 ft. 9 in). Since above date has had many vicissitudes and at present V.=5/21 each eye. In R. E. the retina is detached up and out. L. E. Vitreous very hazy, no fundus lesions made out.

CASE 4. J. M., male. April, 1918, a cloud came before R. E. First seen by Dr. Gemmell of Monessen, Pa., who reported that V. at that time was; R. E. 6/40; L. E. 6/6. One month later it had fallen in L. E. to 6/40 due to an extensive hemorrhage. He was later under the care of Dr. Burke and also Dr. Greene, of Washington, D. C. When seen by me Oct. 14, 1919. R. E. 5/35; L. E. hand movements at 3/4 M. He was the youngest of a family of 2 males and 2 females. All living and well. His mother died in a few minutes of hemorrhage from nose and mouth. Father living and healthy.

Physical examination: 5 ft. 3 in. Weight 132 lbs. Bones of lower part of face heavy. v. Pirquet positive. Wassermann negative. Skiagraph of skull nothing abnormal. Urinalysis normal. Blood—Slight anemia. Coag. time slightly increased to normal. Pulse ranged from 72—120. Temperature from 97.4° to 99.4°. L. E. Divergent. R. E. Numerous hemorrhagic opacities in vitreous. Periphery of fundus visible and shows some organized tissues. L. E. No red glare from

pupil. At end of one week V.=R. E. 5/12; L. E. Fingers at 1/3 M. End of 2 weeks R. E. 6/6 pt. L. E. Unchanged. At this date tuberculin injections were begun, and 10 days later V. in R. E. had fallen to 1/60. Subsequently it temporarily rose to 5/4 and when last tested, 5 days later, was 5/9. Two months later the patient sailed for Italy and wrote that vision seemed about the same.

In all of these four cases the Wassermann was negative. In 2 the tuberculin test was positive, in one negative and in one not recorded. Blood pressure was normal in all. Coagulation time of blood was normal in 2 and slow in 2. The blood count showed no marked alteration. Hemoglobin was below normal in all.

In all four cases the treatment was much the same as will be spoken of later. The effect of treatment was uncertain, as fluctuations in vision dependent upon hemorrhages occurred and one eye would improve and the other grow worse despite the nature of the treatment. In the second case, because of the failure of the left eye to improve while the right continued to fail, it was decided to try fibrolysin. As the patient lived at a distance and intended shortly to return home it was deemed expedient to use every other method which offered any hope at the same time. Twelve doses of 2.3 cc. of fibrolysin were given in the course of a month. At the same time subconjunctival injections of salt and of dionin were used. At the end of this time V. R. E. remained unchanged, that of L. E. had improved from l. p. to 1/100.

ETIOLOGY. The predisposing causes which stand out in this disease are age and sex. The age limits at which it occurs in males fall within the period of adolescence. In the vast majority of cases the male sex is afflicted. The nature of the underlying cause of the bleeding is not so definitely determined. The views held by the earlier observers as to the fundamental causes are probably due to the limitations of research of the period. Eales originally attributed the condition to auto-intoxication resulting from constipa-

tion; but in his second paper was more speculative and viewed the condition as a neurosis affecting both the circulatory and digestive systems—a vasomotor contraction of the vessels of the alimentary canal resulting in a compensatory dilatation of the systemic capillaries. Nettleship's idea that gout was the cause is hardly tenable at this day.

The researches of Stock and Axenfeld, which have thrown so much light on the tuberculous nature of certain types of endophlebitis have led to the acceptance of tuberculosis as the cause of the type of intraocular hemorrhage with which we are dealing. According to Knapp the tuberculous nature of recurrent vitreous and retinal hemorrhages was developed entirely from clinical factors, positive tuberculin reaction, presence of tuberculous lesions in other parts of the eye and in the rest of the body. The tuberculous origin is often supported by the family history and the previous history of the patient. Axenfeld suggests that where vitreous hemorrhages occur without previous appearance of tuberculosis of the eye, they may be due to tuberculous involvement of the retinal vessels either directly or indirectly by the toxins of the bacilli.

The clinical histories in many of the reported cases are not definite enough upon the question of the manifestations of tuberculosis from which to draw conclusions. Among 25 case reports, in less than 20 per cent there was either no statement as to the clinical or laboratory evidences of tuberculosis or it was noted as absent. Perhaps no better summary of the evidence favoring tuberculosis as the cause, could be had than that of Jackson, who concludes "that in the well recognized association of intraocular hemorrhage and subsequent connective tissue formation, constituting retinitis proliferans, we have the same association of pathologic processes as in tuberculous lesions in general. The few cases that have been studied anatomically, the responsiveness of a large number of cases to the specific tuberculin test, and the relative

recoveries that are now recorded to the credit of the recognized treatment of tuberculosis, give sufficient basis for the view that tuberculosis, chiefly of the retinal vessels, is the essential nature of the clinical condition, represented by cases of recurrent retinal hemorrhages in young persons, followed by retinitis proliferans."

The view that seems to meet with most favor is that the disease is an autotoxic one, the source of the toxemia being in most cases the intestines. As the result of this toxemia, inequalities of the circulation occur either too high or too low blood pressure. Many clinicians of authority seem not to be strongly impressed by the tuberculous view. Thus Fuchs and also Römer consider the nature of the affection unknown. Collins believes that the coagulability of the blood is raised, and that this leads to the formation of thrombi in the venules which rupture as the result of the vis a tergo.

Nieden believes the cause to be slow development of the sexual apparatus, in these cases unrelieved, as in females by menstruation. This view is also held by Koenigin; and Panas believes that the nature of the disease is the same as epistaxis. The latter even suggesting the name "epistaxis interoculaire." Both Nieden and Panas evidently agree with Hutchinson and Eales in considering the blood pressure an important factor as they state that by studying the sphygmographic tracings of the pulse we can not only determine the cause of the difficulty, but tell the prognosis very accurately.

There is some difference of opinion as to the source of the bleeding. Mostly it appears to come from the retinal venules. Nieden, however, believes that it comes from the choroidal vessels, and an anatomic study by Brewster confirmed this view. In other cases it seems to come from the vessels of the ciliary body. Eales attributes the more frequent involvement of the left eye to the origin of the left common carotid direct from the arch of the aorta, and the more circuitous route of the innominate vein, both favoring a higher vascular tension. Both Eales,

and Niden believe that the menstrual function acting as a safeguard accounts for the rarity of the condition in females. Schweigger denies the correctness of both of these clinical points, as to the preponderance of male sex and of the left eye, but recorded cases bear out Eales.

PATHOLOGY. Very recently Fuchs has recorded the anatomic changes which he observed in a large number of vitreous hemorrhages of spontaneous origin. The hemorrhage occurred on the outer surface of the vitreous, in the posterior lenticular and orbicular spaces and into the vitreous itself. In rare cases they were confined to the outer limiting layer, the blood corpuscles being within the lamellar structure of this layer, or they were spread immediately under it, coming usually from the ciliary region, or they penetrated into the interior of the vitreous. The change in the hemorrhages most frequently noted was hemolysis, i. e., exit of hemoglobin and lipoid from the corpuscles. This process takes place within a month of the time the hemorrhage appears in the vitreous, but does not occur uniformly.

There is no reaction in the vitreous as the result of the presence of the hemorrhage or its derivatives. The absorption of the blood is in part effected by phagocytosis, but in case of large hemorrhages absorption is due more to hemolysis and the formation and the removal of the granules, or where the hemorrhage is traversed by connective tissue the gradual disappearance of the corpuscles enclosed in its meshes. The formation of connective tissue begins from the ciliary body or the retina and is more likely to occur when beside the hemorrhage there is some inflammatory reaction. It was first seen fourteen days after the occurrence of the hemorrhage in the form of fibroblasts going in towards the blood, then in between the corpuscles to form long narrow threads or membranes. In other cases the connective tissue is developed on the surface of the hemorrhage, making a membrane around it. This formation of tissue may go on with or without phagocytosis.

Schreiber found that the greater part of blood injected into the vitreous disintegrated at once at the site of the injection and was taken up by migratory cells from the ciliary processes and the perivascular lymph spaces of the central vessels, while the anterior chamber took no part. In the greater number of cases in the course of one or two weeks there could be demonstrated connective tissue formation presenting the microscopic picture of retinitis proliferans. Some reaction of the neuroglia is seen at the points where groups of hemosiderin containing migratory cells accumulate in the retina; this usually occurs in the lower part. Here also is seen glial proliferation of Müller's fibres. The connective tissue formation of the papilla plays the most important part in the development of retinitis proliferans. Parsons holds the same opinion as to the part played by the mesoblastic tissue of the papilla in the reparative reaction.

Sugamuma concludes that the newly formed tissue in proliferating retinitis results from a proliferation of the retinal glial fibres as well as connective tissue subsequent to hemorrhages.

PROGNOSIS. The prognosis of the disease is grave. As stated by Roemer it is very remarkable how rapidly the resorption of such hemorrhages takes place, while that of an ordinary hemorrhage is wretchedly slow and incomplete. (I think that this is sometimes due to the slow coagulability of the blood in this affection.) But unfortunately there is the marked tendency to the formation of connective tissue membranes, which not only cover portions of the retina but may cause its detachment.

TREATMENT. The treatment resolves itself into an attempt to prevent the recurrence of the hemorrhages and to bring about the absorption of the extravasated blood. There is considerable testimony as to the curative value of tuberculin in the cases in which tuberculosis was the cause or an associated condition. Alterative drugs such as iodid of potassium, Donovan's solution, syrup of the iodid of iron and syrup of hydriodic acid in large doses,

seem all to be of some value. Darier advises the use of vasoconstrictors.

Ormond, Ollendorff, Thilliez, Westphal, Lamb and others have had sufficient success with fibrolysin to recommend its use. In one case in which I used it the effect was negligible. Bennett, in a typical case with retinitis proliferans where practical blindness had resulted and all of the usual drugs, including fibrolysin, were of no avail, secured a permanent improvement to 6/6 and 6/18 after 3 weeks use of thyroid.

I have thought that the use of thyroid extract was of real value. The use of radium is of doubtful utility, because the greater resistance of connective tissue cells than epithelial cells to its influence possesses an element of danger.

In view of the variability of many of the factors that have been considered as of possible etiologic importance; the very definite picture of tuberculosis of the retina not usually found in these cases; the fairly constant age incident, that is, adolescence, in the cases occurring in males; the physical condition of the patients as described by Eales and present in some of my cases—lassitude, low spirits, variations in local temperature, cold hands and feet, in other words, asthenia, the tendency to over size in 3 of my cases, and the beneficial effect of thyroid in the treatment of the disease, the thought has long been in my mind that disturbed secretion of some of the ductless glands may be an important etiologic factor. As the activities of the endocrin organs are interlocking it would be impossible probably to indicate definitely the one at fault, altho the symptoms

point to the adrenals as the primary one.

In connection with another hemorrhagic affection, Moret speaks of the cause as being probably an interference with the angiotonic functioning of the ductless glands, probably the adrenals. In discussing this idea with Sajous he stated that the adrenal secretion acts directly on the arterioles and sustains their tone, and further that this function when deficient, owing to relaxation of these precapillary vessels may represent in "Recurrent Vitreous Hemorrhages of Adolescence" an indirect cause of the hemorrhages. He further pointed out that the sympathetic system is studded with adrenal medullary substance, supplied probably by the medullary portion of the adrenals, and says that "If this is true the sympathetic ocular supply must also suffer—another cause of vasodilatation, probably of the choroidal vessels."

I do not wish it to be understood that I wholly reject the tuberculous cause of this disease, but I do think that some other factor must be found to explain the striking characteristics of this group of cases and that this may be found in the adrenals, whether acting independently or in conjunction with tuberculosis. I merely put it out as a suggestion that should be borne in mind in the further study of this affection, tho it is well also to remember that, to paraphrase a recent sentence of MacRobert,—the endocrin organs possess a strange proclivity to evoke suspicion towards themselves as being the source of incomprehensible ailments.

RECURRENT RETINAL HEMORRHAGE OF ADOLESCENCE.

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This report of a case and comparison of it with a case previously reported by the same author was read before the American Ophthalmological Society, June 16, 1920.

In 1912 I reported before this society the case of a young man (F E. B., aged 22), where there were not only repeated and extensive hemorrhages into

the vitreous, but a most pronounced perivasculitis especially affecting the veins, followed in each eye by proliferating retinitis, vascular veils, partial

detachment of the retinae with almost total loss of vision in the right eye (20/200) and complete loss of vision in the left eye. The present case, resembles the former case in that there were repeated vitreous hemorrhages followed by retinitis proliferans, detachment of the retina and loss of vision; but differs from it in two particulars, first, in that the optic nerves were affected, and second, in marked choroidal changes in both of the eyes. The full case report of number 1 (F. E. B.) may be found in the Trans. Amer. Opth. Soc. Vol. XIII, 1912., pp. 235-256. The report of the second case is as follows:

CASE.

E. W., aged 19 years, male, machinist. First consulted me June 25, 1918, giving the following history. One year previously the vision in the left eye was suddenly lost and the eye has remained blind since. As it caused him no pain he paid but little attention to it. Five days ago, the vision in the right eye was suddenly and all but completely lost; and, of necessity, he was compelled to seek advice.

Family history: Father had suffered from "bone tuberculosis" and died of brain tumor; Mother died of meningitis; has two brothers, one older, who has never been troubled with his eyes, and one younger, who has had trouble with one eye, the nature of which was not stated. The patient himself has enjoyed good health and continued to work at his trade as a machinist even after losing the sight in the left eye. He is a tall, slender, blond with a delicate skin and high color. Height, 5 ft. 11 in.; weight, 150 lbs. Temperature this morning 99°. Pulse 76.

Eye Examination: R. 10/200. Eccentrically L. perception of light.

Pupils normal in size and reaction, large central scotoma in right almost circular in shape. Ophthalmoscopic examination shows: Right eye, retinal veins greatly enlarged and tortuous, with the arteries but slightly enlarged; the macular region is markedly edematous, and there are choroidal changes under and about the retinal veins (chorio-retinitis) in the upper and

lower half of the fundus in the medial zone, and also in the peripheral temporal part of the fundus. Vitreous is clear.

Left eye: optic disc is elevated 3. D. the retinal veins are markedly enlarged and tortuous as also are the arteries, but to a lesser extent; there are very pronounced choroidal changes especially following the course of the blood vessels, being more pronounced at the periphery of the fundus where also the retina is involved. The retina and vitreous have connective tissue bands with blood vessels in them (retinitis proliferans), the retina itself being detached in spots far peripherally. There is one large spot of choroidal atrophy just below the optic disc and another further down near the periphery, some pigment is collected on one side of the upper and larger patch. Two small hemorrhages are present in the retina, on the temporal side far out at the periphery. The vitreous is clear of opacities. Tension normal, or slightly minus, in each eye.

June 29th, the von Pirquet test was only moderately positive, altho a fresh hemorrhage appeared in the left eye.

July 1st, gave O. T. subcutaneously. The second night following the injection, the patient had a severe chill and was unable to sleep. The arm was red at site of injection, and the temperature went to 99°.

July 6th, temperature 97.3; gave 2mg. O. T. The following day the patient waked up with a severe headache, pains in the back and legs and a feeling of weakness all over. Temperature 101.2°, pulse 100, arm greatly swollen and marked congestion in right fundus. Three fresh hemorrhages in the left fundus with increased swelling of the optic disc.

July 12th, six days following the second diagnostic injection of 2mg. of O. T. the patient feels much improved, temperature and pulse normal. The retinal hemorrhages in the left eye are almost completely absorbed, while the edema at the right macula is greatly reduced. V.=R. 15/70. Gave 2mg.

B. E., vial 1, (Mulford), that is 1/10,000 mg.

July 17, (17 days after the first subcutaneous injection was given) V.=R. 15/20 minus. L. 1. p. The edema at macula in right has disappeared, leaving, however, some fine radiating dotted lines, star-shaped, at the macula. In the left the swelling about the optic disc has subsided, and but one small hemorrhage remains in the retina.

July 25th, (eight days later). While sitting still the vision in the right eye suddenly "faded out." When seen next day, the vision was reduced to counting fingers, and the ophthalmoscope showed the vitreous full of blood. The left eye remains as when last examined. Tuberculin treatment was continued and the vision in the right eye came up to 16/70 after some months.

February 24th, 1919. Detachment of the lower half of retina in each eye, and retinitis proliferans well marked in peripheral portions of right were noted.

R.=Fingers at one foot, excentric.

L.=Perception of light.

The patient later came under the care of Dr. Charles Graef, of New York City, who has been kind enough to report what he did for him and the ultimate result, which I herewith append.

"July 8th, 1919. E. W. was brought to me a year after you first saw him, and for some time had been led about quite blind. I found a faint trace of light perception in the upper part of the right eye only; the retina widely detached and the interior so obscure that no more details could be made out. I did a trephining on the right eye six weeks ago and have had a very excellent result. The retina became replaced, the vitreous cleared, and he goes about the city now quite well alone. He has of course, only excentric vision, as the macula is blotted with old exudate. The veins which were very tortuous and swollen are improving very noticeably. He is highly delighted and has gone to the country for the summer."

May 23, 1920. "The later history of the boy is as follows, he went to the country some weeks after I operated on him, and retained useful vision for nearly three months. The detachment then recurred and he returned to me. He begged me to operate the eye again

and I did so. This time I applied a cautery point to the trephine openings which I made in two places, hoping thus to get better and more lasting adhesion, but the operation was not a success and he lost his sight."

COMMENT.

In the two cases reported by me, it is of interest to note the points of similarity, and also the features in which they varied. The former case, F. E. B., reported by me in 1912 before this society has been under my care since that date, and examined as late as May of this year, and the following note made. May 5, 1920. Patient had a sharp pain in his right eye last week which lasted almost an hour. Vision was not affected, R.=15/200, L.=light perception. Ophthalmoscope: right eye shows floating specks in the vitreous; no hemorrhages, but, retinitis proliferans pronounced. Posterior cortical cataract developing. Left eye has mature secondary cataract. Tension normal in right; slightly plus in left. General condition of patient very good.

Points of Similarity, General: Both were males, young, slender, but well muscled, in perfect health until date of eye trouble. History of tuberculosis in family of each, negative history as to syphilis, gonorrhea, etc. Both reacted strongly to the tuberculin tests—general, local and focal.

Special: Each had recurrent retinal hemorrhages into the vitreous, retinitis proliferans and finally detachment of the retinas and loss of sight. Case 1, F. E. B., lost sight completely in one eye and maintained 15/200 only in the other, while Case 2, E. W., lost sight in both eyes.

Points of Variance: Case 1, F. E. B., (1) Had a pronounced perivasculitis from the start, the retinal vessels being affected from the disc to the extreme periphery of the fundus; (2) The optic nerve was little involved and secondarily;

Case 2, E. W., (1) Had no perivasculitis noted at any time; (2) The optic nerve was markedly involved in the left eye (+3D); and moderately so in the right, with pronounced edema at the macula; (3) pronounced choroidal changes especially in the left eye.

It seems therefore that we may have different types of the same disease, the main distinctive feature of which is the recurrent retinal hemorrhages. In fact, Siegrist² has described two types of the disease; in one, the veins, especially at the periphery, are involved; while the optic nerve and the veins in and near the optic nerve are not involved. In the other type the central veins and optic nerve are involved. Gilbert³ is given credit for first describing the type where the nerve and central veins are chiefly involved. It would appear therefore that the first case (F. E. B.) reported by me falls under the first type, where the peripheral vessels are more involved; while the second case (E. W.), comes under the type of optic nerve and central vein involvement.

Etiology: Most observers are, I believe, in accord with the opinion expressed by Axenfeld and Stock that many cases of recurrent juvenile hemorrhages are due to tuberculosis. However, Steffan⁴ reports a case of hemorrhagic retinitis in a patient 23 years of age, who had acquired syphilis a year before, and it is suggested that syphilis may be an etiologic factor in rare cases. I would suggest also that it is possible in some cases that both tuberculosis and syphilis are etiologic factors. As but few such cases come to section, the cause of the disease in most instances must be arrived at by clinical observations, the tuberculin reaction tests, experiments and the history of the case.

Fleisher⁵ reports a case in which one of the eyes of a patient suffering from this disease came to section, the eye having been removed because of secondary glaucoma. It tended to confirm Axenfeld and Stock's opinion from a pathologic standpoint. The patient was a man, 36 years of age, suffering from pulmonary tuberculosis. The left eye was the first to be affected with periphlebitis and retinal hemorrhages, some patches of choroiditis being ob-

served. The anterior portion of the eye was not affected. The hemorrhages absorbed and the phlebitis subsided. The second eye, however, was affected a year later, with nodular iritis, retinal hemorrhages and a pronounced periphlebitis. Because of a complicating glaucoma, the eye was removed.

Microscopic examination showed the disease in the iris and anterior part of the eye was most likely of tuberculous nature, also the changes about the retinal veins, where "typical groups of epithelioid and giant cells, in places showing slight necrosis, were present, forming nodules lying on one side of the vessel, or sheaths surrounding them, were considered to be tuberculous formations. This in spite of the fact that the tubercle bacilli could not be demonstrated. And, further, the case is supposed to prove that hemorrhages of this type are due to actual tuberculous foci, and not, as recent opinion has tended to assume, to tuberculous toxins."

Van Duyse⁶ reports a case of recurrent retinal hemorrhages with periarteritis, polar cataract, and apparent neuro-retinitis, which he considered due to a "pathologic state of the internal secreting glands," tuberculosis and syphilis being excluded.

From the foregoing citations it will be seen that the etiology of this obscure disease still remains in doubt. However, the weight of opinion, based on clinical and experimental observations together with the tuberculin reaction tests and the few pathologic reports that have been made, leans heavily to tuberculosis as the chief cause. Occasionally other factors may enter into the etiology.

Treatment: Besides keeping the patient in the best physical and mental condition, unfortunately little can be done to alter or check the progress of the disease.

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OCULAR TUBERCULOSIS.

F. B. BOGARDUS, M.D.,

RUGBY, N. D.

A general survey of this subject here given, is lacking from text books in which it might be expected. With this survey the methods of diagnosis and treatment employed at Bellevue Hospital, New York City, and reports of four illustrative cases are included.

The manifestations of tuberculosis, which the ophthalmologist is called upon to diagnose or treat are located most frequently, in the choroid. The cornea, iris, ciliary body, and retina are not attacked so often, altho in a busy eye clinic, many cases of tuberculous anterior uveitis will be seen.

TUBERCULOSIS OF CHOROID.

Tuberculosis of the choroid occurs in three fairly distinct forms: choroiditis exudativa, miliary tubercle, conglobate tubercle. The first of these is not different in appearance from choroiditis due to other causes, and may be disseminated or discrete. It is the most frequent type. In the beginning of this disease, there is a formation of yellowish patches of exudate, over which the retinal vessels are seen to pass. These patches are located at any portion of the fundus. They may be single or multiple, and of various sizes.

When fresh the patches of exudate are not sharply outlined, but have a hazy, indistinct edge; quite different from the appearance in the later stage of atrophy, when the patch stands out clear cut and sharply defined, with a lining of black pigment. Early the color is somewhat yellowish, while later it is more of a pure white, due to exposure of the sclera. In some cases quite large areas of sclera are visible, due to coalescence of neighboring spots.

In many cases the disease becomes arrested, leaving only a small atrophic spot in the choroid, or sometimes the exudate may even be absorbed leaving the choroid intact. In other less favorable cases the disease progresses, vitreous opacities increase, the lens becomes opaque, the retina detached, and atrophy of the globe follows.

The symptoms relate mainly to vision, and vary from slight impairment

to blindness. In the early stage of exudation there is irritability of the retina, with subjective sensations of light, balls of fire, and sparks before the eyes (Fuchs). Scotomata are present, affecting vision according to their location.

Miliary tubercles of the choroid are much rarer than the exudative type, in fact, they are among the diseases of the eye which are seldom seen. They are small patches of exudate, 0.5 to 1. millimeter in diameter, often multiple, and represent the typical miliary tubercle as found in any part of the body. With the ophthalmoscope, the growth of the tubercle may be observed in all its stages. At first a rapid growth is seen from day to day, of a yellowish, grayish exudate, with ill defined margins. Then the tubercle ceases to grow, and gradually the exudate is absorbed, leaving small round white areas in the choroid, which have a punched out appearance. Often there will be a deposit of fine grains of black pigment in the base and margins of these areas.

These tubercles of the choroid are not seen in apparently healthy persons as is the first type, but are found in patients with miliary tuberculosis, tuberculosis of the bones and joints, and tuberculous meningitis. They have great diagnostic importance, where miliary tuberculosis is suspected.

The conglobate tubercle of the choroid is a tuberculous nodule that often appears as a small tumor projecting out into the vitreous. It may be hard to differentiate from a sarcoma of the choroid, or a neuroepithelioma of the retina. If the diagnosis is in doubt, the eye should be removed, since it is lost in either case, and an early enucleation is imperative if it should be sarcoma (1).

RETINAL TUBERCULOSIS.

The retinal tubercle has been lucidly described by Jackson in a recent paper (2). He states that it is usually connected with a vein or artery, most frequently the former. A yellowish spot appears, with indefinite margins and gradually covers over the affected vessel. It reaches its full size in a few days. When an artery is affected, it shows little change on either side of the exudate, but a vein will become dilated in limited portions so that these parts are three or four times the diameter of the normal vessel.

These retinal exudates after a time become vascularized and fade away in many cases, leaving the retina in the same condition as before the attack. In other cases the exudate is not entirely absorbed, but is converted into fibrous tissue, which has the characteristic shiny white appearance of retinal exudates in their later stages. There are also white spots in the macula such as are seen in albuminuric retinitis, which may later disappear leaving no trace.

Retinal tuberculosis is undoubtedly the most common cause of recurring retinal hemorrhage. When these hemorrhages become absorbed and replaced by shining bands of fibrous tissue, we have the condition known as retinitis proliferans.

TUBERCULOSIS OF ANTERIOR SEGMENT.

Tuberculosis of the anterior part of the eye is called tuberculous anterior uveitis. Its symptoms vary according to the structure most seriously involved. It may appear mainly as a keratitis, an iritis, an iridocyclitis, or an iridochoroiditis.

Tuberculous disease of the cornea usually resembles syphilitic interstitial keratitis so closely that a clinical differentiation is impossible. Here we have the deep infiltration and steamy condition, with formation of macules which characterize keratitis. Blood vessels penetrate into the cornea beneath its surface. In the tuberculous, as in other forms of keratitis, it is usual to have an involvement of the iris and ciliary body. When these are affected,

we often have a sign that has great diagnostic value. It is the deposit of grayish spots of exudate on Descemet's membrane, which have the color of tal-low. They are called mutton fat deposits, and usually mean tuberculosis.

As the iris partakes in the inflammation, it loses its lustre, and adheres to the lens. Miliary tubercles may sometimes be seen on it, as small grayish nodules. As the disease advances, occlusio pupillae occurs from organization of exudate in the pupillary area. As a further evidence of involvement of the ciliary body and choroid, we have the formation of floating opacities in the vitreous.

DIAGNOSIS.

The diagnosis of tuberculosis of the eye may at times be made clinically, especially in cases of anterior uveitis with mutton fat deposits on Descemet's membrane. Choroidal and retinal tubercles may be recognized with the ophthalmoscope. In the majority of cases, however, the diagnosis is arrived at by injections of tuberculin.

The diagnostic routine for such cases in the eye service at Bellevue Hospital, as ordered by Dr. May is as follows: The history is taken and then a thoro physical examination is made. After this the eye is examined, using oblique illumination, the loupe, and the ophthalmoscope. The paranasal sinuses are X-rayed. The tonsils are examined by retracting the anterior pillar. A blood Wassermann is done, and at times a spinal fluid. When this data is collected, and after it has been determined that there is no active tuberculosis as shown by a normal temperature for twenty-four hours, a diagnostic injection of O. T. is given at night. The amount given varies from 1/10 mg. in children to 1. mg. in adults. A rise of the temperature over 100° within twenty-four hours signifies a reaction. When none occurs, the dose is doubled and repeated in twenty-four hours. If no reaction occurs from this, a third dose is given, 48 hours later, of 5 mg. in adults, and children in proportion. If there is no rise in temperature, and no focal reaction, or no

local hypermia at the point of injection, tuberculosis is excluded. A focal reaction in the eye is diagnostic, while a general reaction with fever, without the focal reaction, is only suggestive.

The prognosis of tuberculosis of the eye is grave. A few cases of mild infection recover, leaving more or less damage. The more serious cases often go on to blindness, from corneal opacities, pupillary membranes, organized exudates in vitreous, and retinal detachment. The final stage is atrophy of the eyeball. In conglobate tubercle of the choroid perforation of the sclera may occur. With the therapeutic use of tuberculin many cases, which hitherto had been uncontrollable, have been brought to a standstill, and some really remarkable results from its use are reported by reliable observers.

TREATMENT.

In the treatment of tuberculosis, hygienic measures are of utmost importance. A high calorie feeding should be instituted, so that the patient takes the greatest amount of food he can assimilate. One or two quarts of milk should be given daily, if it agrees with the digestion. As much of the day as possible should be spent in the open air, but no violent exercise should be taken, nor should moderate exercises be taken to the point of tiring the patient. At night he should sleep in a tent or on a porch. The bowels should be regulated, and the digestion have careful attention.

All foci of infection should be removed when possible, even tho they appear to have no relation to the tuberculous process. Infected teeth are extracted, and suspicious tonsils are taken out. The term "suspicious tonsil" is used, for infection may exist deep in the crypts where it is not easily demonstrated, and it is certain that infection is present, at times, which cannot be seen until after the tonsil is removed. Infected sinuses receive proper attention, and no condition is neglected which may be a menace to the general health.

When tuberculous disease exists in lungs, bones or joints, the indications

for treatment are modified in so far as made necessary by these conditions. Locally, atropin is useful as it puts the ciliary muscle at rest, in conformity with the principle that all tuberculous organs should be inactive until healing has occurred.

The specific treatment consists in injections of T R, and is given where the eye condition is the principal lesion. It is customary to start with a very small dose, depending somewhat upon the strength of the reaction to the diagnostic infection. If a prompt reaction follows the first diagnostic injection, the dose is smaller than if the reaction only occurred after the second or third dose. An average first dose is 1/50,000 milligrams. This is smaller than the dose given in some of the New York Eye Hospitals, but with this dose we have found that a focal reaction is extremely rare, while with a first dose of more than 1/50,000 mg., an unpleasant aggravation of the disease sometimes occurs. It is most important in using tuberculin therapy at all times to avoid a marked focal reaction, for it may undo the improvement which has been gained after many weeks of painstaking care.

The dose is given every five days, and is gradually increased. Thus the second dose is 2/50,000 mg., the third 3/50,000 mg., and it is so increased that at the tenth dose the patient gets 1/5,000 mg. This is increased in the same ratio, until he gets 1/500 mg., and then 1/50 mg., always trying to keep below the point of reaction. If a focal or general reaction should occur, the dose must be reduced, and then cautiously increased again. A dose of .01 mg. once a week is not exceeded. These injections may have to be kept up for months, so that patient and physician, are apt to become discouraged. It is well to inform the patient on the start that quick results cannot be expected, altho in many cases rapid improvement does occur.

CASES.

The following cases seen in the wards of Bellevue Hospital represent some of the forms of ocular tuberculosis.

CASE 1. Miliary tubercle of choroid, with tuberculosis of lungs.

M. O. female, age 19 months, admitted to Bellevue, Feb. 9, 1920. Mother gave following history: Breast fed up to 15½ mo., also solid food from table. Constipated since six months of age. Has had a cough for last five months. For last ten days has been quite sick, with rapid respiration, vomiting and loss of weight.

Examination.—General condition poor with appearance of severe illness. Temp. 102, pulse 140. The right apex dull on percussion, with bronchial breathing, and moist rales on coughing. Tubercle bacilli found in sputum. On examining the left eye with the ophthalmoscope, a choroidal tubercle was seen to the left of the macula. It had a clover leaf appearance as if three tubercles were joined together and it was in the stage of regression or atrophy. The edges were sharply defined and tiny dots of black pigment were scattered over the whole base.

CASE II. Miliary tubercles of the choroid and acute general miliary tuberculosis.

P. D. female, age 13. Admitted March 7, 1920. This patient has had tuberculosis of the joints for the last eight years, which affected the hip, elbow and knee. Had an operation on right elbow four years ago, and has worn a hip brace for last two years. Four weeks ago was taken sick with symptoms of influenza, such as headache, cough, pains in back, coryza and fever. These lasted fourteen days, and gradually subsided. A few days later the neck became slightly stiff, headache returned, and she vomited occasionally. At times she would appear to be unconscious for an hour or more.

Examination.—On admission showed temp. of 102°, pulse 120, stupor, rigid neck, paralysis of left external rectus muscle, and dullness of right apex with bronchial breathing. The joints mentioned above were tuberculous, but there were no sinuses. Wassermann for blood and spinal fluid negative. Spinal fluid negative for tubercle bacilli. The urine contained much albumin, with coarse and fine granular casts.

Blood showed leucocytes 10,000, polymorphonuclears 84%, transitionals 2%, lymphocytes 14%.

Examination of the right eye with ophthalmoscope showed two grayish white patches close together, just above the macula. Their outline was rather indistinct, and the diameter of each was about ⅓ the diameter of the disc. The left eye showed a similar patch, two disc diameters from the disc, close to the superior temporal vein, and another nasal to the macula. Retinal vessels appeared to be elevated where they passed over these tubercles. This patient died about seven days after admission.

CASE III. Tuberculous interstitial keratitis or anterior uveitis.

A. H. female, age 43. Admitted Oct. 31, 1919. Patient stated on admission that vision in right eye had been failing for the past seven months. Examination of the right eye showed moderate injection of palpebral and bulbar conjunctiva, also ciliary and episcleral injection. There were maculae in the cornea; near the limbus, at upper and outer parts. The whole cornea was slightly hazy. The iris was discolored, and reacted very sluggishly. The fundus was seen very indistinctly, due to the condition of the cornea, and was normal as far as could be determined. In this case the Wassermann was negative, and examination for a focus of infection in teeth, tonsils, sinuses, lungs, bones, joints, Fallopian tubes, did not reveal anything of importance. An injection of 0.5 mg. O. T. was given for diagnosis, and was followed by a rise in temperature to 101½ deg. within 18 hours. There was distinct focal reaction in the eye as well as local reaction at the point of infection. Therapeutic injections of tuberculin were instituted with the usual accessory measures. At the present time, five months later, the injections are still being given. The condition has greatly improved so that all evidence of irritation has about disappeared, altho we cannot pronounce her cured as yet.

CASE IV. Tuberculous iridocyclitis or anterior uveitis.

T. B. age 22. Admitted Nov. 8, 1919. Patient has had good eyes up till 18 mo. ago, when the right eye became painful. It has been irritated most of the time, until quite recently, when the irritation subsided. The sight in this eye has gradually failed, so that on admission, she has only perception of hand movements at two feet. The left eye became inflamed two months previous to admission, with pain, photophobia and lacrimation.

Examination.—Right eye showed atrophy of eyeball with diminished tension. Cornea clear with lower half of anterior chamber filled with a grayish exudate. Iris dull, atrophic and adherent to lens. Pupillary space occluded by a membrane.

Left eye showed circumcorneal injection with a bluish zone of deep hyperemia. Cornea clear, and on Descemet's membrane were the small mutton fat deposits. Iris hyperemic and swollen, and adherent to lens in places by fresh exudates. The lens itself was clear but opacities were seen in the vitreous. Fundus indistinct, but apparently normal. Vision 20/200.

In this case a blood Wassermann was negative. Infected tonsils were removed, and an injection of 0.5 mg. O. T. gave a positive focal and general reaction. Tuberculin was started in therapeutic doses and is still being given, with moderate slow improvement in the left eye.

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INTRADURAL TUMORS OF OPTIC NERVE WITH REPORT OF A CASE

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Cases of this condition are worthy of record both for their rarity and their clinical interest. With the report of such a case, studied in the Department of Pathology of the Ohio State University, there is here included a brief statement of our present knowledge regarding such tumors.

In discussing intradural tumors of the optic nerve Parsons gives a brief historical sketch, in which he states that Wishart in 1833 and Middlemore in 1838 were the first to report such cases and that Goldzieher in 1873 separated optic nerve tumors from the extradural orbital tumors. von Graefe in 1864 gave the main diagnostic points of such tumors, while Leber, in 1877, was the first to attempt the differentiation of tumors arising within the sheath of the nerve from those without. In 1901 Byers collected one hundred and two cases from the literature, which he subdivided upon a histologic basis. The most recent study of this class of tumors has been made by Hudson, who in 1912 collected one hundred and fifty-four cases. These he divided into three groups: (1) Gliomatosis,

(2) fibromatosis of the nerve sheath, and (3) endothelial tumors of the nerve sheath, placing one hundred and eighteen of the cases in the first group and again subdividing this group into those designated as (a) gliomatosis, (b) probably gliomatosis, and (c) probably not gliomatosis. Under the second heading he placed six cases, the remaining cases falling under endothelial tumors of the sheath.

Such primary intradural tumors are met with most commonly during the earlier years of life, corresponding in this respect with the gliomatous tumors of the brain. Eighty-five of the cases cited by Byers gave exact data as to age; of these sixty-seven occurred in children before the fifteenth year, fifty per cent of the sixty-seven occurring before the fifth year, only four of

this series occurring subsequent to the twenty-fifth year of life. Because of this early age incidence and of the absence of any definite etiologic factor, it has become generally accepted that these tumors usually arise from some form of embryonal or congenital defect in the structure of the nerve tissue. In some instances, however, direct trauma is given as the exciting cause.

The usual symptoms presented by patients suffering from intradural tumors of the optic nerve are a slowly progressing exophthalmus which, in

enlargement being found in the middle portion of the nerve; it may, however, involve that portion in the posterior part of the orbit and even extend into the intracranial portion of the nerve. The growths also vary markedly in consistency, some being quite firm and dense, others being soft and of a more gelatinous consistency. Ewing describes the structure of gliomas occurring in the brain substance, as consisting of "glia cells and glia fibers of various forms and in varying proportions. In many the typical spider cell is pre-

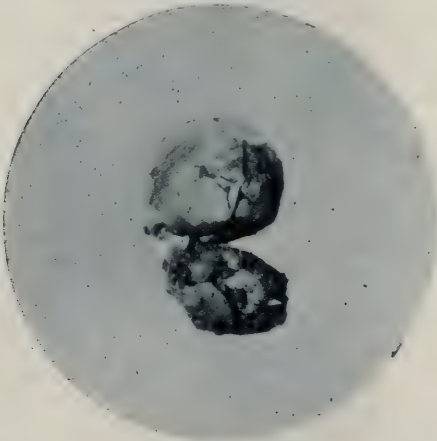


Fig. 1.—Photograph of eye with tumor of the nerve attached.

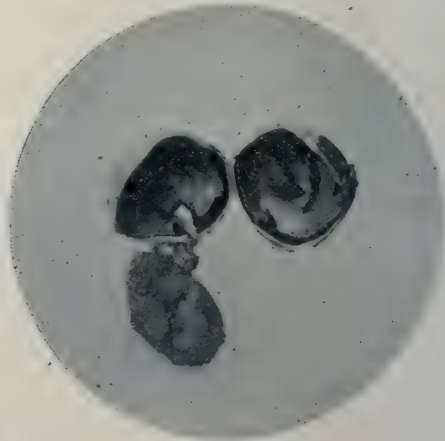


Fig. 2.—Photograph of eyeball after section with the tumor of the nerve.

the majority of instances, is directly forward, and a gradually developing blindness. Movements of the eyeball are limited and pain is absent until the tumor has attained a considerable size. The ophthalmoscopic examination reveals an optic neuritis and a choked disc.

Anatomically, the tumors are situated within the dural sheath of the optic nerve and are sharply differentiated, both macroscopically and microscopically, from tumors arising within the sheath itself or growing in the orbit outside the sheath. The intradural tumors differ greatly in size, varying from a barely perceptible swelling in the course of the nerve to tumors 3 centimeters in diameter. The anterior portion of the nerve, or that portion in immediate proximity to the eyeball, is usually not involved, the main

dominant. This cell has a small compact nucleus and a scanty cytoplasm, from which radiate numerous comparatively short fibers. In other cases the cells are larger and the fibers longer and less numerous. In certain tumors the cells are large and possess cytoplasmic processes containing large nuclei or multiple nuclei, and closely resemble ganglion cells." Tumors growing within the optic nerve, grouped under the head of gliomata, differ rather markedly from this description. These tumors contain the same small cell with dense nucleus and scanty cytoplasm. The cells, however, are rather widely separated in a substance that is spoken of as gelatinous or edematous and in which fibrils are made out with some difficulty, and with certainty only after special neuroglia stains have been used.

Histologically, the structure of intradural tumors has given rise to considerable discussion. Byers states that "such tumors do not correspond with any special type of growth, but there is constantly present in the same specimen several phases of developing connective tissue." He has drawn an analogy between these changes and the changes occurring in elephantiasis due to primary obstruction of the lymph flow and uses the term "fibromatosis" to define such growths. He further states that there is essentially an over-

Prentiss, "the embryologic derivation of such tissue is from cells of the neural type, which divide by mitosis and give rise to ependymal cells of the ependymal zone and to indifferent cells of the mantle layer; from the latter cells spongioblasts and neuroblasts are formed. The spongioblasts are transformed into neuroglia cells and fibers which form the supporting tissue of the nervous system, while the neuroblasts of the primitive cells, by developing cell processes, are converted into true neurons." With this view Mallory

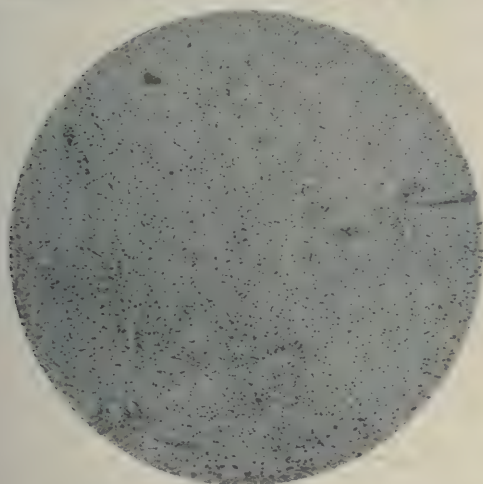


Fig. 3.—Photomicrograph showing general structure of the tumor. 16 mm. objective.

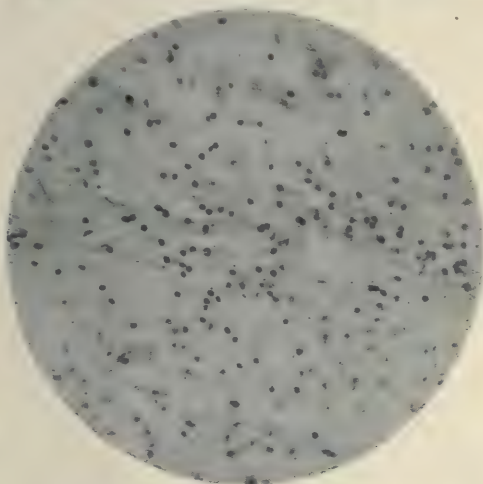


Fig. 4.—Photomicrograph illustrating the two types of glia cells with the fibrillar network. 4 mm. objective.

growth of connective tissue, which is protean in character, and that the feature described as myxomatous is in reality a simple edema due to elephantiasis. Ewing, in discussing two cases examined by himself and which he designates "neurofibroma of the optic nerve," states that they "consist of numerous small cells of the type of the glia cell, which lie in compact groups or singly in a mucous matrix." Hudson suggests the term "degenerative gliomatosis," implying a generalized overgrowth of neuroglial tissue of infiltrating character, dependent on some degenerative change of unknown etiology.

Again, the exact origin of the cells composing these tumors, whether epiblastic or mesoblastic, has also caused more or less discussion. According to

coincides, describing a "glioblastoma as a tumor of epiblastic origin in which the cells tend to differentiate into neuroglia." Hatai, on the other hand, has proven with some conclusiveness that a certain portion of the neuroglial cells are derived from the mesoblastic tissue which enters the nervous system about the blood vessels and that the neuroglia cells, with larger nuclei and less abundant fibrils, are of true mesoblastic origin.

From this brief discussion of the more general features of such cases, it may be seen that primary intradural tumors of the optic nerve are worthy of record not alone for their rarity, but also for their clinical interest and because they represent rather complex histopathologic features. The following case is therefore reported because

of the definite interest that obtains in this subject.

CASE REPORT.—A boy, age 10, white, had been brought to a physician because of a gradual loss of sight of the right eye. There had been no unusual disease of the part and no history of previous injury to the eye or cranium. At this time there was no exophthalmus. The boy had had the usual diseases of childhood; otherwise the history is negative. Seven and a half months later he came under the observation of an ophthalmologist. At this time exophthalmus was pronounced, the eye being forced directly forward; blindness was complete. Immediate surgical removal of the eye was advised and consented to by the parents.

Gross Examination. The tumor consists of a mass 3 x 2.5 cm., whose closest proximity to the globe is 8 mm. The tumor is somewhat irregular and shows distinct nodules on its surface. It is intimately surrounded by a rather dense fibrous capsule, which undoubtedly is the dural sheath. Upon section, the tissue is of a grayish color, which in some areas has a reddish tinge. It varies in consistency in different portions, some areas being dense, others softer, altho in no portion could it be described as edematous or gelatinous. The optic nerve, at its entrance into the eye ball, is normal in appearance and measures 3 mm. in diameter. At a point some 6 mm. from the globe the nerve is slightly constricted and beyond this point becomes lost in the anterior border of the tumor mass.

Microscopic examination shows that the tumor consists of a loose feltwork of fibrillar tissue, in which are scattered numerous small, deeply stained nuclei, which show a rather definite tendency to group themselves. The cytoplasm of these cells is scanty and, in many instances, cannot be distin-

guished. In some areas pale staining, round or oval nuclei are seen scattered about among the more typical glia cells. These cells are considered as belonging to the second group of glia cells mentioned by Hatai. Extending thru the mass are strands of coarse fibrous tissue, which subdivide the tumor into irregular areas. The blood vessels are numerous and pass directly thru the substance of the tumor, being enclosed by a connective tissue sheath, which is intimately surrounded by the fibrillar material. In certain areas no fibrils can be distinguished; the substance appearing more or less homogeneous. In this homogeneous matrix are spaces, of irregular size, resembling spaces in which fluid had accumulated, and giving the impression that the tissue had been more or less edematous in character.

The sections of the tumor were stained with hematoxylin-eosin, Mallory's phosphotungstic acid hematoxylin, Van Gieson's alum-hematoxylin, and Pal-Weigert stains. The Pal-Weigert stain was not successful, due to improper fixing of the tissues before reaching the laboratory. The phosphotungstic acid hematoxylin, however, showed distinctly the neuroglia fibrils, while the hematoxylin-eosin and hematoxylin-Van Gieson stains permit nicely the demonstration of the general structure of the tumor.

CONCLUSION.—From a perusal of the literature and the careful study of the tumor presented in this paper, it appears to the writers that the growth here recorded should be classed as a true tumor and that the terms "degenerative" and "fibrosis" are not adequate to explain its existence.

We wish to acknowledge our indebtedness to Dr. R. L. Barnes for the specimen and to Dr. R. Blee Smith for the clinical history of the case.

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TONOMETRY AND THE PREVENTION OF GLAUCOMA

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By use of his tonometer in a large proportion of his cases the writer has discovered many instances of slight increase of intraocular pressure above what is usually regarded as normal; and in many instances the patient has experienced relief from the use of miotics. A series of illustrative cases is given. The results of manometric tests comparing the Brown tonometer with other such instruments is also reported.

At the 1919 meeting of the American Medical Association Dr. John E. Weeks¹ read a very valuable paper on Personal Observations Regarding the Treatment of Glaucoma. Had Weeks published the important facts stated in his paper when his book on the eye was published, and before my papers were published on the concavity of the disc and the necessity of field taking in practically all refraction cases, he would have saved me and possibly many others much anxious and painful groping in the dark. Cases in his words "in which the tension is at or near the upper limit of normal, in which the anterior chamber is shallow, and in which there is even slight cupping of the whole or a part of the disc" will be found to be astonishingly numerous when we properly examine our cases.

But what is "the upper limit of normal?" Weeks says 25 mm. of mercury as determined by the Schiötz tonometer. McLean² says: "With this (McLean) tonometer the lower limit of normal intraocular pressure is to be considered as 22, while I have not found a normal eye registering above 40. I have placed the upper limit at that figure; because I have found eyes registering 40 in which there were no symptoms, subjectively or objectively, of glaucoma. * * * I have found a few eyes that registered 36 with the McLean tonometer and 22 with the Schiötz in which symptoms of glaucoma were present."

Priestley Smith's estimate of 25 mm. as the upper limit of normal, accepted by Weeks, seemed to me to be reasonably conservative, but when during my investigation of tonometers I found that a considerable number of cases registering 25 could be lowered by the use of miotics, and that some cases

presenting such symptoms of glaucoma as shallow anterior chambers, more or less cupping of discs, contracted fields and enlarged blind spots, gave much lower readings, I became very suspicious of all such standards. Since the completion of my tonometer with a foot-plate of six mm. diameter (American Journal of Ophthalmology, Jan., 1920, p. 48) I have tested the intraocular tension of practically all my eye patients coming for refraction. The results have been surprising. I may say that there are very few children in my clientele.

The examination with the tonometer is made as a matter of course when any condition of fundus or field renders such examination desirable; and, strange as that may seem to some ophthalmologists, nearly all my cases furnish sufficient justification for the inconvenience of such an examination. Since discarding alcohol or sulphuric ether sterilization, and uniformly heating the foot-plate and plunger above a gas flame or preferably in the Bunsen gas jet, there have been no unpleasant results. Three drops of 1% holocain at five minute intervals will render nearly all corneas insensitive. A single drop of eserine solution is instilled after the test.

The patient lies on his back, is urged to relax as much as possible and fixes his eyes on a black spot directly over his head on the ceiling. The tonometer held lightly between the thumb and two fingers, by the *one armed handle*, is applied directly over the center of the cornea; the handle depressed till the weight of the instrument rests upon the cornea, and the reading made. If the patient's muscles are tense, or the physician's hand unsteady or the patient moves the eye, or the instrument is not vertical, there will be oscillations

of the needle and unsatisfactory readings. If used with reasonable care and skill I have found the readings more satisfactory and reliable than with the standard instruments.

At the meeting of the Minnesota Academy of Ophthalmology and Otolaryngology, at which my tonometer was exhibited, Gradle made the criticism that the McLean and my instruments were attempts to make absolute readings in disregard of the standard established by Schiötz. He also remarked that not one woman in a hundred could look vertically, so that the tonometer would rest properly over the center of the cornea, which made two or three readings desirable. With a large foot-plate of the Schiötz and McLean tonometers the personal element of doctor and patient is much greater than with my instrument; the small plate of which is more easily placed over the pupil, and the more "absolute" reading is more reliable, because the importance of correspondence of the curves of the cornea and foot-plate is eliminated. I wish to give a few cases which seem to be typical of those which come to me.

Case 1. Charles I. B. 15, about 1. D. myopic astigmatism, small central cups of discs, tonometer: R. 25, L. 22 mm. Some weeks later 22-27.

Case 2. Mrs. G. 54, mother of eight living children, severe headache and twitching of eyes lately, wearing plus 2. and plus 2. segments for near, which give nearly normal vision. Corneas anesthetic, pupils small, anterior chambers shallow, eyes hurt on motion and tender to pressure, form and color fields moderately contracted, slight if any cupping of temporal discs, blind spots enlarged: 20 and 23.

Case 3. Mrs. B. 52, 10.D. myopic (Case 8 of my paper read in 1917 before the American Academy of O. & O.-L.) lately complained of difficulty in threading a needle, distant vision good and fields only moderately contracted, tonometer: 50-40. Twelve days later after use of eserine 1-1000, tonometer 25-23, some weeks later 20-20.

Case 4. Moses B. 30, Jewish laborer, chronic conjunctivitis, corneal nebulae,

anterior chambers shallow, temporal cups of discs, fields contracted, blind spots enlarged, V. 20/200, only slightly improved with weak minus lenses, tension 23-25, some months later 17-20.

Case 5. H. C. E. 43, bookkeeper (when first seen two years before slight cupping of temporal discs), fields contracted, blind spots enlarged, slight general cupping of discs, V. 20/15 with—.25—.25c. 180°, tension 30-30. Seven months later right eye irritable and tender, V. normal, tension 40-25, discontinued attendance.

Case 6. A. McC. 60, attorney, with correction of low degree of compound myopic astigmatism V. 20/20. Corneas 10 mm. and anesthetic; fields and blind spots nearly normal, temporal discs deeply cupped; tension 25-32, one month later 32-32.

Case 7. H. M. 48, attorney, temporal discs cupped, blind spots slightly enlarged, form fields nearly normal, red mostly inside ten degree, V. 20/15 with +.75+.50 c. 90. Two years later pyorrhea and pain in eyes, vision and refraction as before, red fields inside five degrees, tension 40-40. Now willing to use a miotic. Eserine 1-2000 causes pain, 1-6,000 used with comfort. Jan. 1, 1920, thirty-five days later, tension 25-33, 18th, 20-30, Feb. 5th, 25-28, April 1, 10-9, later some pain in eyes, tension 24-20, with McLean tonometer 14-14.

Case 8. W. M. 61, farmer, brother of Case 7, almost a duplicate including fields, tension 30-30. Did not return.

Case 9. C. D. S. 45, school principal, has had for some years serious nervous and digestive troubles and has had an immense amount of treatment by internists, specialists and dentists, including those of a world famous clinic where he was told that he was a nervous wreck. He now declares that my removal of his adenoids and tonsils, and treatment of his paranasal sinuses, were the only tangible benefit he can recognize from all of it. I had ordered glasses for him years before, and as no complaint was made of the eyes I had later made no investigation of them. To my great chagrin I found, when he came with his child for an operation, that he was 45 years of age and had

worn no glasses for some years. V. with $+0.50$ c. 90° was $=20/20$, exophoria $8\frac{1}{2}^\circ$, at $13''$ 17° ; corneas anesthetic, chambers shallow, temporal discs deeply cupped and the vessels undermined; the right blind spot slightly, and the left greatly enlarged, form fields slightly and the color fields greatly contracted, tension 22-25. He was given a 3° prism correction in each distance lens, and in each reading segment, also one drop of 1-6000 solution of eserine at bed time. Six weeks later the tonometer readings were 15-22.

Case 10. E. F. B. 28, writer, has for some years worn 6° prism correction of his exophoria ($1\frac{1}{2}^\circ$ at $20'$ and 20° at $13''$) in each reading lens, 1 D. less than his full correction:

R. -1.75 — 2.25 c. axis 160° , V. $20/20$.

L. -4.50 — $4.$ c. axis 180° , V. $20/20$.

Having discarded his reading glasses for some months he had headaches. There is a small central cup of right optic disc, larger temporal concavity of the left disc. Form fields nearly normal, color fields moderately contracted, right blind spot greatly enlarged, the left only slightly, tension 28-28. After an operation for hernia and chronic appendicitis, and using his proper prism reading correction for three weeks, tension was 10-18.

Case 11. Laura S. 19, telephone operator, has had severe headaches, has a moderate compound hyperopic astigmatism which has been fairly well corrected. V. $20/15$ and $20/20$. Right hyperphoria 1° , exophoria 4° , abduction 11, torsion negative, excessive outward rotation of right and inward of left (60°), tension 43-38. Eserine 1-6000 soon reduced tension to 28-32. Discontinued attendance because of advice to operate on muscles.

Case 12. Mary B. 13, Jewish, meibomian inflammation of lids, following use of homatropia, tension 50 in each eye, after 16 days use of eserine 1-2000 tension was 32, with Gradle tonometer 20.

Case 13. Marion N. 16, student, headaches for years, vision blurred all her life. Under homatropia $+1.25$ c. axis 90° , V. $20/20$; temporal discs cupped, fields contracted, tension 45-40. Under

eserine 1-1000, tension twelve days later was 50-50, the following day under more intensive use of miotic 35-30, eight days later 48-43 and with McLean tonometer 37-35. She had a frontal sinusitis improving under treatment and diseased tonsils. One week after removal of adenoids tension was 25-20.

Case 14. A. B. 37, umbrella mender, father of case 12, incapacitated for work several days at a time, past five or six years, because of headaches and dizziness. Treated at University hospital and other free dispensaries, also a world famous clinic, in vain. None of the doctors found trouble with the eyes. Vision with $+.25$ c. axis 180° $=20/30$ and $20/40$. L. H. 1° , esoph, 1° , $13''$ Ex. 13° . Temporal discs cupped, fields much contracted especially the left, blind spots somewhat enlarged, rather unmanageable and the tonometric readings unsatisfactory but tension seems plus. The following day reported that the first drop of eserine 1-6000 made the eyes feel better, and the left less tender, tension 38-39. Eserine 1-1000 soon brought tension to 28-30. Very little headache or dizziness since wearing refraction correction, with vertical prism correction.

Case 15. Mrs. Minna W. 57, no complaint except of need of reading glasses. V. with weak compound convex lenses $20/15$ and $20/20$. Temporal discs cupped, blind spots much enlarged, fields greatly contracted, tension with the McLean tonometer 29-24. Two weeks later following the use of eserine 1-12000 McLean 18-22, Brown 32-35.

Case 16. A. P. A. 28, student, severe headaches. V. $20/20$ with $-.75$ cyl. L. H. 2° , Exoph. 8° , fields contracted, blind spots enlarged, tension 40, after two months use of eserine 1-12000 tension 25 in each eye.

Case 17. N. O. 22, student, chronic conjunctivitis, V. $20/20$ with weak concave lenses; fields and blind spots defective, temporal discs cupped, tension 40-40. With frequent use of eserine 1-2000 eyes felt better but tension remained mostly above 30 till a 1-1000 solution brought it down to 23-25.

Case 18. W. C. 39, retinitis pigmentosa, vision $10/200$ and $20/200$, not im-

proved, tension 47-34. After use of eserine 1-1000 for six days tension was 28-30.

Case 19. Miss M. A. W. 51, vision 20/70 and 20/200, not improved, anterior chambers shallow, marked retinitis pigmentosa, vessels narrowed and optic discs slightly cupped, form fields inside five degrees, tension 48-52. Visited Hickson's faith cure meetings. After four days use of eserine vision 20/50 and 20/70, tension 25-27. Still later accepted a weak convex correction with vision 20/50, tension 50-50, with McLean 31-31. After another two weeks corrected vision +20/40 and tension 35-35. It is an interesting coincidence that the lowest tonometric readings were shortly after the attendance at the faith cure meetings.

Case 20. A. P. 52, shoemaker, has had weak eyes all his life, pain over his eyes, especially the past week before consulting me on April 26th. Wears from optometrist +2. spheres and +2.75 reading segments. Vision 20/20 with R. +2.75+.75 c. axis 180°, L. +2.75+.25 c. axis 180°.

Corneas 10 mm. anesthetic, anterior chambers shallow, moderate general cupping of discs, blind spots slightly enlarged, fields slightly contracted for white, more for red, tension by palpation questionable, by tonometer 35-35. After four days use of correcting lenses and eserine 1-2000 tension is 30-27.

These nineteen out of more than one hundred and twenty-five cases, carefully examined since the completion of my tonometer last September, are hardly more pronounced than many others of the series, not one of which but has shown more or less of the signs of chronic glaucoma. Such an array of facts abundantly proves to me the truth of what I have more or less modestly suggested in previous papers: That chronic simple glaucoma is closely allied with a practically universal condition resulting from the failure of evolution to produce an eye capable of standing up under the stress of modern civilization. It is hardly supposable that my cases are entirely different from those going to other men. The

natural inference is that most men fail to properly examine their cases. They trust to their text books and the leaders of the profession and recognize glaucoma when it is so far developed that only desperate remedies can possibly avail. When ophthalmologists examine every case of refraction as a possible case of glaucoma they will be just to themselves and to their patients; and can with better grace protest the work of opticians and optometrists.

Several hundred measurements of intraocular tension with my tonometer, in many instances in comparison with the Schiötz, Gradle-Schiötz and McLean instruments, have convinced me that my instrument is much more dependable and practical than the others; and that its registration while much higher in terms of mercurial pressure, is the only one that really represents such pressure in millimeters. I present the following evidence:

To minimize the possible error of the mercurial manometer with which I had standardized my tonometer, I constructed a water manometer as follows: A three-inch piece of brass tubing 15 mm. in diameter, closed at one end by being soldered to a metal base, was connected near the lower end with a short piece of 6 mm. tubing, to which a three way piece of glass was adjusted by rubber tubing. To one end of the three-way tube was connected a glass tube five feet in length, and pinned to a wooden support. To the other was connected a hard rubber cock to which a large hollow needle could be connected by rubber tubing. Two thicknesses of rubber dam attached securely and water tight to the upper end of the larger brass tube formed an artificial cornea. The upright was marked of course in millimeters multiplied by 11 1/9. For convenient and safe demonstration I have used rubber tubing in place of the glass, but am sure the glass forms a more accurate instrument.

On April 17 Dr. Charles Nelson Spratt invited me to Eitel hospital to try out my tonometer and manometer on a blind glaucomatous eye which he

was to enucleate. Tension before enucleation was 65 (McLean). Five minutes after removal of the eye tension by my tonometer was 15. Fifteen minutes later the vitreous chamber was pierced by a needle of about 1.5 mm. which was connected with the manometer. The following measurements were made: (Dr. S. using the tonometers.)

1. Comparison of artificial and enucleated eyes:

	Artificial Enucleated	
Water at 30	Eye	Eye
McLean tonometer	16 and 15	19 and 20
Brown tonometer	34 and 40	30 and 30

2. Comparison of readings of McLean and Brown on enucleated eye:

	Height of	
McLean	Water Column	Brown
27	40 mm. hg.	11 1/9 40
26	42	27
29	35	29
22	32	35
20	30	30
30	27	35
25	25	25

The following are readings based on the artificial cornea; from the Brown in comparison with the other tonometers:

Water	McLean	Gradle	Schiötz	Brown
80	31	24		78
70	26	26	28	70
60	28	24	25.5	65
50	19	18	25.5	62
40	18	17	22	35

35	17	9	20	30
30	16	9	19	25
25	13	4		25
20	10		17	20
15	—10			15
10			13	10

A few comparative measurements of intraocular tension:

	McLean	Gradle	Brown
Mrs. A.	35-38		45-45
Mr. H.	37-37	30-30*	50-40
Mrs. S.	26-26	24-20†	30-32
Mrs. W.	23-22	11-13	40-38
Mr. W.	22-27	13-17	32-32
Mrs. D.	26-26		38-38
Mrs. L.	26-26		36-36
Mrs. S.	26-24		30-33
Mrs. S.	21-22	17-17	40-40
Mr. N.	27-26		35-36
Miss W.	31-31		50-50
Mrs. McL.	20-22		30-30

*Day before 39-37.

†Two weeks before 50-50.

With thoroly anesthetized corneas, the patient looking at such a point as will bring the axis of the tested eye vertical, and the Brown tonometer applied with reasonable skill and held long enough to secure an accurate minimum, the readings will be almost as dependable as the measurement of a board with the carpenter's rule. That statement is true of a considerable number of cases, while in others there may be some oscillations of the needle and a disposition to make too high readings.

ETIOLOGY OF GLAUCOMA.

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Widely differing ocular lesions are known to be followed by glaucoma. But how, if in any way, they help to cause the disease is often obscure. This paper, reviewing its subject somewhat from the theoretic standpoint, attempts to determine the relation of these different conditions to the disease.

To the solution of this problem nothing new need be brought, nor is there herein anything novel propounded. The difficulty has been that we have not been able to see the forest on account of the trees. In other words—the de-

tails have clouded the main issue. It is not new knowledge that is needed, the mass of this is already overwhelming; but what is needed is that known facts should be correlated, coordinated, analyzed and their proper place as-

signed to their causal relationship. I trust that whatever may appear as dogmatic in this essay will be pardoned; but its restricted length will not permit of discussion of the reasons for such assertions.

Here is submitted for consideration the thesis; First: That glaucoma is not a disease but an expression of some systemic disorder. Second: That the glaucomatous condition is due to an imbalance between the inflow and outgo of the intraocular fluids, and that this imbalance is a disturbance of osmotic pressure from a proportional alteration between the colloids and crystalloids in the blood, lymph or aqueous. Third: That such alteration is brought about by chemic, toxic or biochemic changes in these fluids. Fourth: That the causes usually given for glaucoma; viz: old age, arteriosclerosis, macrolentis, microcornea, fibrosis of the pectinate ligament, etc., are not prime causal factors but are when such exist, predisposing or contributing only.

The foregoing applies to every type of glaucoma, excepting only traumatic, postoperative and such localized infections as invade and block up the channels of exit of the ocular fluids; intraocular hemorrhages and neoplasms come under this heading. Buphthalmos is purely an anatomic anomaly; but even here who may say whether or no the same causes which are operative later in life may not have been so in utero. The emotional type, while probably a vasomotor disturbance, has a causal factor as expressed by the disturbance which this induces in the colloidal balance of the dissolved protein in the blood plasma. If the sympathetic nervous system plays any causal role whatever in glaucoma it does so only as this is a part of the general toxemic condition.

The profession is of one opinion regarding the one essential fact of the glaucomatous condition—viz.: that the high tension is an imbalance between the inflow and outflow of the ocular fluids, and that all the symptoms which make up the clinical picture are consequent therefrom. This is self-evident

but from this point of agreement there begins a divergence of opinion as to what brings about this altered interchange of fluids in the eye. Let us take up one by one, the causes usually given for an increased ocular tension and see how the arguments for these balance against the contentions embodied in this thesis. In so doing anatomic facts relative to the ocular structures and pertinent to this inquiry will be considered.

First. *Old age.* This is too inconsequential to be considered seriously. Senility might be, but even of the senile how comparatively few have glaucoma. The law of probability would rule out this cause except as contributory, and only then is it so when the degenerative changes which have led up to the senile condition are the results of such toxic or autotoxic influences as have altered the chemical or physical properties of the intraocular fluids and are still active.

Second: *Arteriosclerosis.* This demands a larger consideration. In the first place one is apt to assume, that with high systolic pressure there is an increased flow of blood to a part, and that increased pressure means arteriosclerosis. Neither of these assumptions are true. In fact, with an arteriosclerosis there is a lowered capillary tension and a consecutive venous stasis. This, per se, should cause a diminished lymph outflow unless the endothelial cells take on a hypersecretion. This is unlikely but what is most probable is that there is a chemical alteration in the lymph or in the aqueous from an altered secretion thru the ciliary glands. Only with a normal arterial wall is high systolic pressure a factor in increased ocular tension, and this is not a constant one for nature provides by the arrangement of the ocular circulatory system a governor to control an excessive supply of blood to the eye.

Barring transient vasomotor disturbances, an increased arterial pressure is due to toxic, infectious or autotoxic influences. A high systolic pressure is no criterion as to the condition of the arterial wall. There may be sclerosis with hyper—, normal or even hypoten—

sion, or marked hypertension with no sclerosis. Sclerotic hypertension is nature's protective measure and we have learned by sad experience that it is neither safe nor wise to attempt more than its proper regulation to the diastolic pressure. It is not the sclerotic process which concerns us in the consideration of the etiology of glaucoma, but rather the causes which have led up to the sclerosis. The same toxic influences which give rise to high blood pressure without sclerosis will induce the latter if the cause be long continued.

Before taking up the alleged *anatomic causes*, it is pertinent to mention one single fact which carries an incontrovertible argument against these. We may have and do have cases which exhibit all of the symptoms which have come about from increased intraocular tension, cupped disc, enlarged blind spot, and narrowed fields, but in which, as measured by the tonometer, no increase in tension is present. This means that whatever cause may have been present is not now active. An anatomic anomaly does not admit of variations but must needs be a constant condition. Another argument against this lies in the amelioration of the symptoms of acute glaucoma by a thoro flushing of the bowels and how the removal of septic foci, notably of the teeth, tonsils, and the nasal passages lower the tension and enlarge the fields of the chronic type. Such treatment could by no possibility alter anatomic conditions.

To attribute glaucoma to *fibrosis of the pectinate ligament* seems to rest on a very slender foundation. Fibrosis is an invariable sequel to advancing years, but age alone does not bring on glaucoma. Furthermore, even should this be found in many glaucomatous eyes, what is to determine if this be a primary causal influence or is a result and a secondary condition from the disease. The spaces within the pectinate ligament are lined by an extension of the endothelial cells which cover the posterior surface of the cornea and its function is presumably that of other dialysing membranes. To attribute to it any mechanical function in the filling

or emptying of Schlemm's canal would rest upon which of the two theories of accommodation we accept, and in either event would be slight indeed.

Macrolentis is another of the anatomic causes given. If the lens enlarges in its polar diameter its only effect would be to push the pupillary margin of the iris forward; if in the equatorial, the result would be a slackening of the zonula, the normal tonicity of the ciliary muscle would then increase rather than decrease the filtration spaces. Only when the lens comes forward as a whole would these be impinged upon, and in this event the lental size would be a minor factor only. All lenses grow larger with age, but it needs the change of senility to make this cause operative; and then only is it so when such changes alter the osmotic properties of the intraocular fluids.

It is difficult to understand how *microcornea*,—a rare condition per se—can enter into the causation at all, unless it be a concomitant of microphthalmia—in this event it would be classified with juvenile glaucoma under the heading of congenital deficiencies. There can be no shadow of a doubt that anatomic changes occur in this disease, that the closing of the channels of outflow goes without saying but these are consequences not causes.

To get a clear concept of the pathologic changes in this disease we should hold in mind the scheme of the normal circulation in the eye, and the function of its various structures. The fluids of the eye, no matter what their ultimate destination or function may be, are brought thereunto by the arteries; these dividing up into capillaries and uniting again as veins form a simple and continuous circulatory system. Once in the eye there begins a process which takes the circulation out of the domain of mechanics, and transfers it to the biochemic and the mysterious realm of molecular pressure. Part of the confusion relative to the increase of intraocular tension comes about from the failure to keep clear in the mind the nature and function of the various ocular structures and of the circulatory fluids.

Of the former the only one that enters here at all is the *vitreous*. This struc-

ture is, in common with other cellular elements the outgrowth from embryonic cells and fulfills a definite purpose thru-out life. It has nothing to do with nutrition or secretion and its purpose is purely optical in that it forms a spheric transparent medium, and while it determines the shape of the globe, has nothing to do with its tension. It is mentioned here simply because of its bearing on the hydrophilic theory which will be referred to later. Incidentally it is here apposite to recall that the vitreous is not hydrophilic, the sclera is the only structure that exhibits this property.

There are three *circulating fluids* within the eye, blood, lymph and aqueous, and it must be clearly understood that these have separate and distinct functions and leave the eye thru separate channels. Only one of these, the blood, is in a continuous pathway. It can serve its function only in one way and that is that its nutrient content, either cellular or otherwise, shall pass through the arterial walls. The fluids, the lymph bearing the protein elements and the aqueous holding the crystalloids in solution enter open spaces and having no direct connection with the channels of outflow, it follows that they must leave the eye either by direct pressure filtration or by osmotic action. The lymph has nothing to do with the form or resiliency of the globe, its function is purely nutritive, the aqueous alone governs the tension. This is the one fundamental fact to be held clearly in mind throughout this discussion.

If *pressure filtration* was the active method whereby fluids left the eye, the law of mechanics would demand that there would be membranes permeable to such fluids. But such membranes which line or delimit the emergent channels are covered by epi— or endothelia. Their functions are known as either selective as to nutrient outgoing material or osmotic as to the inflow into their respective channels. In the eye these membranes are semipermeable,—hence, dissolved substances as well as the solvent can pass thru. In the eye it is altogether unlikely that pure pressure filtration plays more than a subsidiary role, or that physical pressure is the main factor in the

maintenance of the interchange of the intraocular fluids. The physical pressure in the normal eye is practically equal in the vitreous and the aqueous chambers, certainly there is not enough difference to permit fluids to pass from one to the other by mechanical force alone.

It follows therefore that the flow from vitreous to aqueous chamber comes not from a vis a tergo, but that the circulation and incidently the volume of the aqueous fluid depends not only upon physical but *molecular pressure*. This is a silent but mighty force and can work against gravity or physical pressure. It is equal to the gaseous pressure which a unit of dissolved substance will exert when in a state of gas, at the same temperature and occupying the same volume as the unit of solution. Osmosis depends upon differences in concentration of two solutions, like and unlike, when separated by a semipermeable membrane, and applies only to true solutions. Typical colloids do not make these, and altho proteins suspended in the blood plasma act like a true solution and exert osmotic pressure it becomes a matter of conjecture whether or not this property is lost when these pass out into the aqueous. It is probable that they do and that they go out of suspension or solution—note the turbid aqueous occasionally seen in cases of glaucoma. In any event whatever increases colloids or decreases crystalloids interferes with osmosis, impedes the aqueous outflow and gives rise to increased intraocular tension. It can be that an altered balance between these in the blood plasma can increase the aqueous inflow, and so give rise to the same condition. Notably this may be so in a high chlorid content of the blood; but this comes also under the laws of osmosis and bears upon the contentions that are held in this thesis.

A brief resumé of the *hydrophilic theory*, which assumes an acidosis, is appropriate in this place. In 1917 I found in a consecutive series of cases of glaucoma marked *acetonuria*. The larger part of these were of the acute type. Dr. Casey Wood, in reply to my letter of inquiry said, "I am quite sure that there is nothing in the literature that involves the

proposition that acetonuria is responsible for, or is a constant accompaniment of the various forms of glaucoma. That systemic alterations have to do with the origin and onset of increased intraocular tension is by no means new. That hypothesis crops up every few years and is then forgotten. I certainly think that if you can establish the contention that acetonuria is a constant concomitant of the essentials of the disease we call glaucoma, it will be real addition to our knowledge of the subject." And so it would have been had it been so found but the next series of an equal number of cases show no acetonuria whatever. The only conclusions that I could draw were that acetonuria was an occasional but not constant accompaniment of glaucoma, was not causal nor even contributory. It is also well known that diabetics in whom acetonuria is so frequently found rarely have glaucoma. I did not know at that time that an acidosis need not necessarily be expressed as an acetonuria, but would show as a low CO_2 capacity in the blood. It is probable, however, in this protean malady, the basic causes of which lie in metabolic changes, that an acetonuria as an expression of an intestinal toxemia may be a part of the pathogeny, not essential or constant but which brings an occasional associate element to interfere with osmosis.

In 1890 Kneis advanced the theory of an endogenous *specific glaucoma toxin* but left this as a glittering generality without attempting to explain its origin. Hertel has shown that in glaucoma the albumin content of the blood was below normal as was also the osmotic concentration. In 1916 von Hippel testing his glaucoma cases found such serologic alterations that he thought these suggested a disturbance of the endocrin glands as causative factors. The past four years have taught us much about these little organs, and we have learned that they are the regulators and not the initiators of metabolic action.

An excess of epinephrin in the blood of glaucoma cases need not be looked upon as a causal influence, but rather as consecutive to or associate with an imbalanced endocrin supply from the other glands of this group. Dr. Hans Barkan

mentions a case of angioneurotic edema in the course of which glaucoma supervened, and in which the ocular tension returned to normal on the cessation of the attack. Maynard reports twenty cases during a wave of epidemic dropsy. These theories are mentioned because they carry the basic idea that disturbance of metabolism is the one factor common to them all. Whether we view this as an anaphylactic phenomenon, as a modified colloidal reaction, as the expression of a toxic condition, or as a chlorid retention does not matter; the one essential fact that stands out is that they all exhibit one common effect—the rise in ocular tension, and as I have attempted to show this can come about only by an interference with osmotic action.

The researches in chemistry, physics and biology of the past few years have given us a new concept of the vital phenomena. Verworn expresses this tersely in saying, "Life is nothing more than a reaction of the colloids." The normal balance between these and the crystalloids is maintained by normal metabolism. Whatever alters this interferes with the multiform biochemic processes going on in the body. Only Omniscience can understand or could give the initial impulse which starts these processes; but once started, their continuance is physicochemical and we may safely apply their laws to a better understanding.

It may be objected that the foregoing is largely theoretic. I admit it but it is not hypothetical. The supreme test of a theory is its applicability to known facts, and this will apply to every case of glaucoma, assuming that it is true (and the writer thinks it is), wherein may be found evidences to prove it. Disturbances of metabolism may start anywhere from the ingestion of food up to its final transformation or absorption by the cell, may be due to disorder in any organ or group of organs of associate function, either from endogenous or exogenous influences and such disturbances begin by perversion of secretion.

Altered metabolism leaves its evidence in the bodily fluids or in the excretions, and it is by the examination of these, serologic, biologic, chemic or micro-

scopic, that disorder may be determined. It is not enough that a single one alone should be tested, all should be subjected to a thoro search. For example: Metabolic changes show in the nitrogen imbalance, but the urea determination in the urine tells us nothing of value unless the nitrogen intake is calculated over a period of several days: An examination of the blood, however, will give us the evidence we are seeking. Likewise with the urine showing an average urea output there may be for this particular patient renal inadequacy, as shown by a high creatin blood content. An excess of indican in the urine may indicate an active suppurative process or an intestinal toxemia. The latter may be present without indicanuria, but the feces will surely indicate this by showing an excess of indol and skatol. An acidosis may give no evidences as expressed by an acetoneuria, but its presence by a low

carbon dioxid capacity in the blood. The urine may have a normal or even subnormal sodium chlorid percentage while the blood will show that there is a chlorid retention.

It is not probable that glaucoma is due to any specific metabolic disturbance, and much work will have to be done to segregate cases, into their respective causal groups; but the roads to the solution of this problem lie along the paths herein indicated. This paper is in a way preliminary to such investigations upon which to report later. The whole subject is a maze of perplexities. Our knowledge is sorely lacking in the biochemistry of our bodies, and lacking this our deductions from the chemical reactions of the body fluids may be erroneous. But there is the road and however much in darkness we may grope we have the sublime hope and an enduring faith of an ultimate emergence into the light.

A GLAUCOMA QUESTION.

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CHICAGO.

This paper discusses the division of glaucoma into congestive and noncongestive forms, and reports two illustrative cases that indicate they are one and the same disease. The difference between their varied clinical manifestations is thought to arise from variations in the power of the coats of the eye, particularly the lamina cribrosa, to compensate the increased tension, and in the activity of the causes which precipitate an attack. Read before the Illinois State Medical Society and published here thru courtesy of the Society and its Journal.

The tendency of observers of late years to separate the noncongestive type from the congestive types of glaucoma, has been attended with more or less success, largely due to the prevalent divergence of opinion as to the form of therapy to be applied in the former type—surgical or non-surgical. This latter phase of the question, however, has no particular bearing on the motive of this paper. This tendency, I am inclined to think, is not due so much to the definite knowledge at hand that the noncongestive type is a distinct entity, as to our inability to explain this phenomenon upon the theories most favorable to the explanation of the congestive types of glaucoma.

Some observers have even gone so

far as to take the definite stand that glaucoma simplex is an absorbtive form of optic neuritis, attended with cupping and a low grade uveitis.

This theory was most self-satisfying, it relieved one of so much thought, it permitted the acceptance and application of the prevalent theories that explained nearly every phase of the problem of glaucoma. But as time went on and those working in the larger clinics where an abundance of material is always present, were able to observe these cases from this angle, they found that it was not quite so self-explanatory, as it seemed originally, the result being the continued divergence of opinion as to the therapy best suited to the noncongestive type of glaucoma.

The observations to follow, extending over a period of years, and deductions resulting therefrom are based purely upon my own opinion. The theory which I wish to present is, I believe, original. I have discussed this problem from this angle with but two observers, for whose opinion I have the most profound respect. One of the gentlemen did not agree with me, the other was quite enthusiastic.

I am thoroly aware of the vast amount of experimental work accomplished, and the many fascinating theories propounded and recorded in the literature. I am thoroly cognizant of their value and appreciate, as we all do, their practical application. To this already voluminous collection I wish to present for your view a theory upon one phase of the question only, and this I am inclined to think, will, in a measure, enhance the other theories now prevalent and looked upon favorably.

In presenting this theory for your consideration I find myself approaching the subject with more or less timidity, this timidity I am inclined to think is largely due, not to its theoretical basis, *per se*, but to its very simplicity.

The questions then for your consideration are:

1. Are the congestive and noncongestive types of glaucoma one and the same disease?

2. If so, why do we have the congestive symptoms in one, and the absence of them in the other?

In answer to the first question I am willing at this time to believe that they are one and the same disease. Their difference in my opinion is but one of intensity of the precipitant and the compensatory response of the eye ball to that condition. I am sure we have all seen cases where the line of demarcation between the different types has been so vague that we would be willing to make a statement one day and reverse ourselves a few days hence. We have all seen cases where but one eye was involved. Again we have seen bilateral cases where in one eye a certain type prevailed, and in the other a different type existed. We

have seen cases where the congestive type has been engrafted upon a noncongestive case. In short, we have all seen every intermediate variety, forming a continuous transition from the simple noncongestive type to the acute fulminating types.

In answer to the second question. I believe the absence or presence of congestive symptoms is largely dependent upon the anatomic development of the eyeball. By which I mean, we are all familiar with the following facts. That certain anatomic conditions predispose to glaucoma, e. g. hyperopia, small cornea, shallow anterior chamber, highly developed muscle of accommodation, and well developed ciliary processes, large lens, diminished circumlental space, etc., etc. The capsule of the eye ball consists of the cornea and sclera, which is more or less fixed, depending upon the age, the elasticity diminishing as age advances. The weakest point in this, we might say, fixed capsule, is the lamina cribrosa. This, we find, varies in thickness from 0.1 of mm. to 0.4 mm. At this point we find a total absence of the scleral tissue. Occasionally a few fibres of the choroid may be present. But it consists almost wholly of the fibres of the optic nerve and the lamina cribrosa. The lamina cribrosa represents less than one-half of the thickness of the sclera and we find this consists largely of yellow elastic tissue. (Collins and Mayou.) We have then an almost nonresistant capsule, with the exception of the lamina cribrosa, which varies in thickness, and is never more than one half that of the sclera, almost entirely composed of yellow elastic tissue.

Certain *physiologic changes* take place that are worth recalling.

The meshwork of the iris angle (ligamentum pectinatum) is a cellular structure at birth, which undergoes a progressive and physiologic fibrosis, with subsequent sclerosis, until finally it becomes a fibrous structure. The individual strands of this meshwork are more than two times as large at advanced age as at birth, as a result the alveoli of the meshwork become markedly reduced

in size. The spongy nature of this meshwork affords free access of aqueous to the venous sinus of Schlemm, thence by tributaries into the suprachoroidal space and anterior uveal venous system. Fuchs' iris crypts afford direct access of aqueous to the veins of the iris.

Pathologically we find early, a sclerosis of the ligamentum pectinatum and of the tissues to the inner side of Schlemm's canal. In acute glaucoma the ciliary body is more or less distended by a venous stasis and may at times almost obliterate the circumlental space, thus pushing forward the root of the iris and lens. In old chronic cases the root of the iris is adherent to the posterior surface of the cornea, blocking off entirely or almost entirely the drainage angle. The openings for the exit of the venae vorticosae are narrowed. The anterior ciliary vessels are usually enlarged. The aqueous is said to contain a greatly increased quantity of albuminoids and inorganic salts. This increase is said to be greater in the acute form. According to Troncoso the colloid nature of aqueous lessens its diffusibility and prevents its free passage into the lymph channels. The cupping of the disc, its different gradations, the dipping of the vessels, the arterial pulsation, the peripapillary pallor, etc., etc.

To me the cupping of the disc is the most interesting phase of the entire glaucoma question. If it is a fact, and one I think, we are all more or less agreed upon, that the depth of the cup is not in direct ratio to the intraocular pressure, then the basic principle of this hypothesis is fundamentally correct. In other words, the disc with the greatest cupping does not indicate the greatest intraocular pressure as seen in the so-called glaucoma simplex and buphthalmos. The disc with the least cupping is seen in the acute fulminating type. Between these two extremes we find every degree conceivable. This being accepted as fact, we can now go on to the next step.

Why this extreme cupping in one case with little or no congestive symptoms and the little or no cupping in the other case with the most pronounced congestive symptoms?

According to the volumetric theory, the normal intraocular pressure depends upon the volume of fluids within the eye ball. Any variation in the quantity gives rise to a change in the pressure. That is, if the balance maintained by inflow or production of fluids and the outflow or resorption is disturbed increased tension takes place. (Henderson.) We need not at this time go into the further details of this theory for the purpose of this paper.

The so-called circulatory theory which takes into consideration the hydrostatic pressure existing between the venous system and the intraocular pressure should be mentioned and remembered. This is largely based upon the fact that the outflow of fluids into the sinus is by diffusion and not by filtration. Further, that the physiologic thickening of the strands of the meshwork of the iris angle furnishes a mechanical obstruction between the anterior chamber and the venous sinus of Schlemm. Thus is maintained the balance of pressure between these two systems.

The Fischer theory, which is based upon the affinity of tissues for water, or the tissue colloids for water, should also be mentioned.

We have then as the most pronounced predisposing factor, the sclerosis of the meshwork of the iris angle and to a lesser degree probably many other factors.

The circulation is probably an important exciting factor, whatever the factor or factors may be that can or will produce a disturbed circulation. What conditions will produce an anatomic pathology or psychic disturbance is not material to this question. Again whether the aqueous as the result is in such state, by that I mean its viscosity, that diffusion thru the iris angle is impeded or impossible, is also not in point here.

The facts remain whatever the predisposing cause, or causes may be; whatever the circulatory factor or factors may be that can precipitate an attack; the resultant state, whether it be a mild or a violent attack of glaucoma, is entirely dependent upon the degree

of the predisposing and exciting factor or factors, and the compensatory ability of the eye to respond to the abnormal condition.

To simplify this statement, let us conceive of a case where the predisposing elements are present in a mild degree and the precipitating factor present to the same degree; glaucoma will result, but the attack may be so mild as to pass unobserved. As time goes on and if this delicate balance is not corrected, other attacks will result; and eventually sufficiently severe to produce symptoms recognized by the patient, when he will consult a physician.

Again we know that if the intra-ocular pressure should rise suddenly to a considerable height, congestive symptoms will result, as in the swelling of the lens in trauma. Again these symptoms are absent when the increase in tension is gradual and remains within narrow limits, as in intra-ocular tumor. I have seen a tumor occupying four fifths of the globe, and at no time was the pressure elevated. Again in buphthalmus we have the marked enlargement of the capsule, the deep ampullaform cupping entirely out of proportion to the pressure. Here we probably have an absence of the precipitating factor and a preponderant presence of the predisposing factor, the anatomic state. Again in ectasia of the cornea or sclera. Disease of these parts preceded the bulging, the intra-ocular pressure was greater than the external pressure and ectasia resulted at the point of least resistance. Again I have seen staphyloma of the sclera in the absence of a history of previous diseases as in the following case which is in point here.

CASE 1. D. B. aet. 67, married, salesman. Above average intelligence. First came under my observation 10/28/15.

Family history—good.

Personal history—subject to dizzy spells which may come on suddenly and is at times compelled to support himself to keep from falling. Also has dizzy spells after close work. Difficult to read with present glasses.

Lost sight in right eye gradually. First noted failing vision about twenty years ago. Has never had any pain or redness of eyes worth mentioning.

Examination disclosed the following:

Right vision, *nil*, no perception or projection. Eye deviated outwards and appears prominent.

Cornea. Deep infiltration, luster absent. Epithelium roughened, but does not take the stain.

Sclera thin and bluish over entire equator. Has a large staphyloma over attachment of internal rectus, another staphyloma not quite so large over attachment of external rectus.

Tension, to finger about 3 plus.

Left, vision 20/80 glasses 20/33 minus 2. Dilitation with euphthalmin. Gave 1+1.00 20/25. Reading, Snellen 3.

Cornea, anterior chamber, iris negative. Lens, riders of incipient cataract.

Fundus, negative.

Tension, taken with Schiötz tonometer, three times.

R.—average 70. L.—22.

Urinalysis repeated, negative. Had passed insurance examination about two years previous.

12-14-15 Tension—again taken with tonometer.

R. average 70, L—18.

Transillumination of right for possible neoplasm neg. 1-16-17 Last seen. Right—Tension high + + + + Vision *nil*.

L. 20/40 Correction 20/33 minus 1—small central opacity developing in lens. Tension neg.

Repeated perimetry disclosed nothing in particular in left eye. The patient in this case has since passed away. I was unable to get this eye.

It was my opinion, in this case, that the scleral staphylomata were the result of the increased pressure. The probabilities are that the lamina cribrosa was thick, or had been forced back as far as possible and the sclera proper then became the point of least resistance and bulged at these points.

Another case in point to this subject is the following:

CASE 2. C. B. aet. 56, married, harnessmaker.

First came under my observation 5/22/17.

Family and personal history good. Is at times subject to rheumatism and left side of face swells occasionally.

Eye history. For the past three years has noted that the vision in his left eye becomes blurred, sometimes so bad that he cannot see to do his work. There is some pain with these attacks, which come and go, but never severe. Eye becomes blood-shot and feels as if pressure was being applied.

Right eye. Vision, fingers at two feet on temporal side only for past two years. Central vision is entirely gone. He does not recall when this first started.

Tension. To finger normal.

Cornea. Anterior chamber negative.

Iris, dilated to 6 mm.

Ophthalmoscopic examination, typical glaucoma simplex, depth of cup about 3 diopters; fundus otherwise negative.

A few stationary cholesterol crystals were found in the vitreous.

Left eye, vision, 15/50, $+.50\text{C} + .50\text{C}$. $180^\circ = 15/33$.

Tension to finger, questionable if elevated.

Cornea, anterior chamber, iris negative.

Ophthalmoscopic findings, media, negative. Many small fresh hemorrhages, both deep and superficial thruout retina. Arteries somewhat contracted. Veins dilated and tortuous. No cupping of disc recognized.

Repeated urinalysis disclosed, both hyalin and granular casts—undoubtedly the cause of the tortuosity of the vessels and the hemorrhages. These hemorrhages were eventually absorbed, with some improvement in vision, veins remained somewhat tortuous.

The disc now showed a possible cupping of one diopter.

Operation. Vision improved slightly. Tension normal. There has, however, since been a gradual decrease in vision. 2/3/20 R. Vision nil. Cupping now about 7 diopters, fundus otherwise negative.

Left. Vision with glasses about 15/50 with difficulty.

At no time has there been an elevation of tension since operation.

A summary of these two cases discloses some interesting points.

In case 1, we found an eye ball with a tension of 70, with marked ectasia of the sclera over the attachments of the muscles, which incidentally is the thinnest part of the sclera proper, with a complete absence of congestive symptoms over a period of twenty years. The other eye being absolutely normal with the exception of the incipient cataract.

In case 2, we have in the right eye a typical glaucoma simplex picture, with about seven diopters cupping. In the left eye a mild congestive type of glaucoma with barely perceptible cupping.

To RECAPITULATE: (1) The outer coat of the eye ball is not in all cases a nonelastic capsule. The lamina cribrosa varies in thickness from 0.1 mm. to 0.4 mm. (Salzmann states that it is impossible to accurately measure the thickness of the lamina cribrosa.) It is made up almost entirely of yellow elastic tissue, and is therefore the point of least resistance. Thus the degree of cupping is not dependant upon the intraocular pressure, but upon the thickness of the lamina cribrosa and the composition of its constituent elements.

(2) There is no positive line of demarcation between a glaucoma simplex and a very mild form of congestive glaucoma. The presence of the so-called lacunar or cavernous atrophy of Schnabel and others found in the optic nerve, which advocates of the glaucoma simplex entity put forth to prove their contention, is also seen in myopia. Stock found the same lacunae in eight cases of myopia. We are all more or less satisfied that advancing myopia is due to disease of the sclera. In other words, we again have the factor of the intraocular pressure greater than the resistance. The fact that the congestive type of glaucoma is never seen in myopia is most significant. Therefore is it not conceivable that these lacunae, which are first seen as tiny clear spaces in the lamina cribrosa and in the optic nerve tissue and are thought to fuse and form larger cavernae, are the result of the pressure

with the eventual pressure atrophy. Schnabel contended that the cupping in all cases of glaucoma was so formed. The fact that the lamina cribrosa may almost entirely disappear, or may bridge across the cup like a cord or lie back against the optic nerve trunk is worthy of record.

SUMMARY:

(1) Noncongestive and congestive glaucoma is one and the same disease, the difference being only one of degree.

(2) The cupping is not in direct ratio to the pressure, but largely dependent upon the thickness of the lam-

ina cribrosa and the nature of its component elements.

(3) The presence or absence of congestive symptoms is entirely dependent upon the congenital or pathologic anatomic state, and the degree of intensity of the precipitating factors.

(4) In glaucoma simplex the absence of congestive symptoms is entirely due to a very thin distensible lamina cribrosa, plus the very mild exciting factor or factors; the lamina cribrosa acting as a sort of compensatory valve to this mild transient precipitant.

NOTES, CASES AND INSTRUMENTS

BASAL CELLED EPITHELIOMA OF THE CONJUNCTIVA.

DAVID H. COOVER, M.D.

DENVER, COLORADO.

In the Ophthalmic Record of October, 1903, I reported a case of papillo-

ance, made up of clusters of soft papillae. They were movable and surrounded by a loop of vessels from which they seemed to spring. It measured 10 mm. transversely by 13 mm. The growth was removed and examined by a pathologist, who reported it to be a papilloma of the cornea.

The eye showed no evidence of the papilloma returning until March, 1913, ten years afterward, when the patient

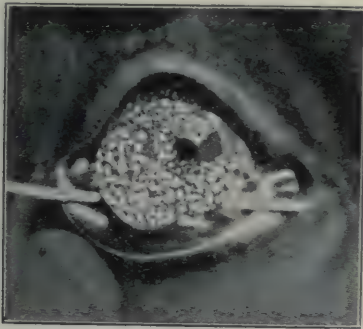


Fig. 1. Papilloma of Cornea Removed 1903. (Coover).

ma of the cornea affecting the right eye in a man 66 years old; which started from a cicatrix at the outer margin of cornea where a supposed pterygium had been removed. The growth grew very rapidly, until it projected over the margin of the lower eyelid and invaded the outer half of the cornea extending around on the lower and inner part of it, Fig. 1. It was pinkish in color; and had the cauliflower, raspberry appear-



Fig. 2. Growth Recurrent as Basal Celled Epithelioma 1914. (Coover).

noticed it coming back. It grew very rapidly to the size as seen in Fig. 2, from a photograph taken when he again presented himself for treatment in August, 1914, eleven years after I had removed the first growth.

The mass had completely covered the cornea and ocular conjunctiva, projecting over the lower eyelid, pushing up the upper lid and filling the whole palpebral fissure; excepting for a small rim of healthy conjunctiva of 3 mm. in width, which extended around the upper and lower eyelids. There was no pain; some secretion and erosion due to exposure. The only discomfort he complained of was from light and dust, which caused him to wear colored glasses.

The growth had the same cauliflower or raspberry appearance as the first one, made up of small clusters of soft papillae. Each papilla was surrounded by a loop of vessels which bled freely when removed. The lids could not be closed on account of the growth projecting beyond them. The eye was removed and care was taken that no diseased tissue was left in the orbit.

The patient is still living and has had no recurrence of the growth.

The specimen was given to Dr. Philip Hilkowitz for examination, who reports as follows:

Macroscopic appearance. The neoplasm, which is of a reddish-gray color, measures about 5 by 3 cm., and has a surface covered with cauliflower-like excrescences. On section a white surface is presented; the tissue is rather soft to the touch.

Microscopic appearance. Sections reveal irregular masses or islands of epithelial cells separated from each other by thin bands of connective tissue and growing in an atypical manner. The epithelial cells are of the basal cell variety. While most of them are active, a few show signs of degeneration or karyorhexis. Here and there are accumulations of colloid substance. In the center of the masses of epithelium are found cells which assume bizarre shapes.

Pathologic Diagnosis.—Basal celled epithelioma.

REPORT OF A CASE OF CRYPTOPHTHALMIA.

SAM N. KEY, M.D.

AUSTIN, TEXAS.

Cryptophthalmia is a rare condition. Turovsky claims that the case he reports in the Roussky Vrach, Volume XV, No. 15, is the fourteenth described in the literature. The case which I report, a twelve-year-old girl, disappeared from observation before I was able to complete my study of the case. Hence I am unable to state whether heredity was a factor, or give other



Fig. 1. Cryptophthalmia Patient Looking Down. (Key).

data which might be instructive in this condition.

On the right side, it will be seen from Figures 1 and 2, the skin of the brow is continuous over the orbit, the skin passing directly to the cheek without any differentiation into the lids. Palpation of the orbit revealed only a soft mass, with no indication of the presence of a globe. The eye brow on this side was present only at the very outer portion and blended with the hair of the scalp. There was a complete absence of light perception.

The left eye also presented an interesting condition. As will be seen from Figures 1 and 2, an eye was present on the left side. This was a microphthalm-

mic eye, being possibly three-fourths of the normal size. The lower lid, tho correspondingly reduced in size, was normal in every respect. The upper lid, however, was imperfectly formed and adherent to the globe. From what should have been the free border of the upper lid, a thin, white film extended downwards, covering the upper three-fourths of the cornea. Figure 2 shows the cornea covered with this film, which is continuous with the skin of the upper lid. No cilia were present on the upper lid, but the eye brow was faintly developed. The lower quarter of the cornea was fair-



Fig. 2. Cryptophthalmia Patient Looking Forward. (Key).

ly clear, and thru it could be seen a blue iris. More than light perception was present in this eye, for movements of objects could be detected. Ocular movements were normal.

The only other abnormality present was a webbing of the fingers of both hands. The patient's behavior and general appearance were suggestive of a lowered mentality.

No operative procedure was contemplated on the cryptophthalmic eye, for in this condition operations have been uniformly unsuccessful. In the left eye the corneal involvement was so great that operative interference seemed inadvisable.

CANTHOTOMY.

FRANK A. MORRISON, M.D.

INDIANAPOLIS, IND.

In the last few years an unusual number of cases of trachoma with corneal ulcers and the usual complications have come under the care of the writer.

It seemed that the mechanical effect of the lid pressure had not been fully taken into account in the production or aggravation of many corneal diseases; and that treatment based upon this had been neglected. For some time canthotomy was a routine measure in all severe trachomas with contracted fissure, but with the publication of Dr. Wyler's experience new interest was aroused and the writer set out methodically to investigate several points, the result of which is given below.

Was lid pressure a potent factor in promoting corneal complications in trachoma, or unfavorably influencing ulcers of the cornea in general? Could such pressure increase the severity, or prolong the disease in the lids themselves? Was it possible to remove undue lid pressure by operation which would not entail a lasting disfigurement? With reference to the last it is only necessary to recall the miserable deformity following a "successful" canthotomy by the accepted method.

To all of the above questions the result of the investigations seemed to give an affirmative reply. As a recital of the particulars of the various experiments would prove wearisome only the results are given.

Having arrived at the conclusion that lid pressure is capable of producing effects outlined above the great practical question was that of relieving such pressure painlessly, safely and without deformity. I might add here, as a question might be raised as to whether or not pressure was certainly removed, that the sensation communicated to the fingers was not relied upon alone, but certain measuring instruments used which eliminated a source of error.

The methods of performing canthotomy varied with the conditions to be

met. In every case the operation was made under local anesthesia. A 4% solution of cocain dropped into the conjunctival sac, a few crystals of the drug pushed well into the outer commissure and a 1% procain-adrenalin solution infiltrated into the skin at the outer commissure.

In cases of corneal ulceration without trachoma the simplest method was employed. A broad cataract knife was passed from the canthus outward toward the temple, held flat-wise so as to split the skin into two layers. This splitting was increased by lateral movements of the knife until a flap one-half inch in length, measured from base to apex, and a quarter of an inch in width was formed. The edge of the knife then turned backward and all the deep underlying structures divided as it was withdrawn. A silk suture entered at the apex of the flap and passed into the conjunctiva, drawn taut, served to force the superficial layer of the skin into the grooves formed by the separated or retracted underlying structures.

In all cases of trachoma one of the succeeding operations were made. Two converging incisions were made, beginning one-half inch external to the canthus and converging toward the angle. At the base these incisions were one-third of an inch apart, and at the apex one-eighth of an inch. The cuts involved only the superficial layers of the skin. A cataract knife entered in the lower incision at the base, emerged through the upper, and by a gentle sawing motion the skin was split into two layers as the knife was carried toward the eye where it cut its way out. The flap now retracted showed the underlying deeper part of the skin, muscle and fascia. These were freely divided from apex to base by the scissors and the skin flap drawn by a suture placed in its apex and attached to the conjunctiva.

In old and neglected cases, especi-

ally those with contracted fissure, in addition to the suture above two others were placed; one attaching the skin of the lower lid to the conjunctiva and a similar one for the upper. These two sutures were identical with the lateral sutures placed in the generally accepted method of performing canthotomy. Sutures removed on the fourth day and the only dressing borated vaselin.

The large number of trachomas coming under observation permitted control observation, that is, both eyes being affected to the same degree one was operated upon and the other not, otherwise the treatment of both was the same.

Without exception the operated eye progressed so favorably, that the fellow eye was operated upon in like manner later, and generally at the urgent request of the patient.

TORIC TRIAL LENSES.

RALPH WALDO PLACE, M.D.

SOMERVILLE, MASS.

Whether toric or flat lenses are better for the individual can only be decided by testing with both.

It is a fact that some see as well and a very few see better with flat lenses than they do with torics. It is a great help to have the two kinds so that first one and then the other can be worn for a few minutes and the difference noticed.

Even with one of the scales for the purpose, it is not accurate to fit a patient by means of flat lenses and then try to figure the equivalent strength in torics.

I began this work with uncut lenses; but I found them unhandy to use.

Several months ago I had a complete set of trial lenses made in the six diopter curves. Since then I have used them in a large number of cases and I have found them to be entirely satisfactory.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

ROYAL SOCIETY OF MEDICINE. SECTION ON OPHTHALMOLOGY

June 9, 1920.

MR. W. T. HOLMES SPICER, Presiding.
Perithelioma of Lid.

MR. R. S. CHARSLEY exhibited a specimen which had been pronounced a perithelioma of the lid. The family practitioner had mistaken the tumor for an ordinary meibomian cyst, and had incised it. When the patient came to Mr. Charsley he removed the growth, and for two months thereafter the man remained in good health. The temporal bone then commenced to enlarge, and the patient noticed that his vigor was diminishing. Two months later still he developed weakness of the spine, and ultimately spinal curvature, probably due to tumor recurrence in the vertebrae. Death supervened six months after the tumor first became prominent. There had been no recurrence at the original site.

DISCUSSION. Mr. Treacher Collins' view was that the growth was alveolar sarcoma, while Mr. M. S. Mayou considered it was perithelioma.

Mr. Leslie Paton related a case of his own in which tho the endothelioma was apparently thoroly removed from the orbit, there was subsequent spread to a number of glands elsewhere, and death was immediately preceded by a large mediastinal growth, of the same histologic nature as the original one.

Neurofibromatosis.

MR. A. W. ORMOND exhibited a case of neurofibromatosis (von Recklinghausen's disease). There was extensive pigmentation over the body, and a number of soft tumors. The main complaint was of headache and failure of sight. His vision in each eye was 6/18, and he had optic atrophy following papilledema. The Wassermann test

gave a negative result. The hands and feet were larger than normal, and the supraorbital ridges very prominent: in addition there was some kyphosis. The systolic blood pressure was 105 mm., the diastolic 80. Mr. Ormond thought the indication was some overaction of the pituitary body, probably following an affection of the fibrous tissue at the base of the brain. He exhibited skiagrams of the skull.

DISCUSSION. Mr. J. H. Fisher thought there had probably been some irritation of the pituitary gland, resulting in hypersecretion, and that this accounted for the acromegaly.

Cyst of Iris.

MR. W. H. McMULLEN showed a case of cyst of the iris. There was in this case no history of injury for implantation of epithelium. The tension of the eye was normal, and the condition seemed to cause the child no inconvenience.

DISCUSSION. Mr. Fisher and Mr. Treacher Collins thought there might have been an unnoticed puncture, and Sir William Lister spoke of the careless habit in some women of sticking needles and pins into handy pillows or cushions, on which the baby might be placed. A puncture of the eye might not be noticed at the time, and it would probably quickly heal. This view was supported by Mr. Ormond.

Corneal Opacity.

THE PRESIDENT exhibited a patient with horse-shoe shaped opacities in the cornea. There was only one complaint, namely, of gradually diminishing vision during the last few years. Only a negative history was obtainable.

Ophthalmic Herpes.

MR. C. W. ROLL showed a child with herpes ophthalmicus. The attack occurred in February last, simultaneously with chicken pox, the eruption remaining on the brow. Part of the eruption

was along the course of the nasal nerve to the tip of the nose: the cornea also was involved. The association between herpes ophthalmicus and chicken pox had been frequently noted. He spoke of other recorded cases, as did the President and Mr. J. H. Fisher.

Punctate Keratitis.

DR. RAYNER D. BATTEN exhibited a patient with superficial punctate keratitis, of two years duration, which had been very resistant to various treatments.

The President spoke of a similar case in which treatment seemed hopeless: eventually the condition seemed to wear itself out.

Anomaly of Canthus.

MR. W. H. McMULLEN's second case was one of congenital malformation in the outer canthus. The other extremities of the left lids were separated by a low pad or cushion of tissue covered with skin. The suggestion of an amniotic band and adhesions before the displacement, seemed to him a plausible one.

DISCUSSION. Mr. Treacher Collins was reminded by this case of a class which was described in the "Ophthalmic Hospital Reports" by Sir George Berry. In the cases shown by that observer there was a symmetric flattening of the malar bones, leading to the impression that the patients were brothers. He thought the most reasonable explanation was that there was delayed closure of the cleft between the frontal-nasal plate and the superior maxillary plate at the outer canthus.

Horn of Lid.

MR. W. L. HINE showed a patient with a malignant sebaceous horn, in which there was a large recurrence, and great benefit had so far accrued from a single (eight-hour) exposure to radium. The case was still under observation.

Exhibits.

MR. T. C. DOYNE showed a case of furrow keratitis, and Mr. Wallace exhibited some of the daylight glass which was due to the research at Cornell University. H. DICKINSON.

SECTION ON OPHTHALMOLOGY AMERICAN MEDICAL ASSOCIATION.

April, 1920.

REPORT ON THE ULTRAVIO- LET AND VISIBLE TRANS- MISSION OF EYE PRO- TECTIVE GLASSES.

In June, 1913, the Council of Health and Public Instruction of the A. M. A. appointed a Committee on Conservation of Vision, of which Dr. Frank Allport, of Chicago, was made the Chairman. Shortly after this, a subcommittee on Hygiene of the Eye was formed for the purpose of determining some of the effects of artificial light upon the eye, and I was honored by being made its chairman, with full powers of appointment, organization and conduct. Realizing the necessity of obtaining the cooperation of investigators who were more or less familiar with the physics of optics and the practical problems of lighting, an invitation was extended to a number of well-known physicists and illuminating engineers to take part in the investigation. Drs. Edward Jackson and Wm. M. Sweet were the other ophthalmologic members of the committee. The committee, as finally constituted, was as follows:

Dr. Wm. Campbell Posey, Philadelphia, Pa.

Dr. Edward Jackson, Denver, Colo.

Dr. Wm. M. Sweet, Philadelphia, Pa.

Dr. C. P. Steinmetz, Schenectady, N. Y.

Dr. Louis Bell, Boston, Mass.

Dr. Chas. F. Scott, New Haven, Conn.

Dr. Percy W. Cobb, Mineola, N. Y.

Dr. H. E. Ives, Philadelphia, Pa.

Dr. E. L. Elliott, New York, N. Y.

Dr. A. W. Goodspeed, Philadelphia, Pa.

Dr. C. E. Ferree, Bryn Mawr, Pa.

Mr. J. Franklin Myer, Washington, D. C.

Mr. P. S. Millar, New York, N. Y.

Mr. George Ross Green, Philadelphia, Pa.

Mr. C. O. Bond, Philadelphia, Pa., Sec. Among the subjects which fell under

the scope of this Committee, was to ascertain if possible the power certain lenses have of absorbing injurious radiant energy, so that oculists and others might have authentic and authoritative data upon which to base their prescriptions. Realizing that such information could only be obtained by those trained in physical research work, the Committee appealed to the National Bureau of Standards, requesting that it undertake the task of investigating the spectral transmission of the various glasses which are being commercially promoted in protecting the eye from harmful radiant energy. The Committee submitted nine samples of glass for investigation; to these the Bureau added seventy-three.

The report of the investigation of these eighty-two samples of eye protective glass, so-called, in regard to their transmission of ultraviolet and visible radiant energy, was issued by the Department of Commerce, Bureau of Standards, S. W. Stratton, Director, June 7, 1919, in pamphlet form, designated No. 119, under the title of "The Ultra-Violet and Visible Transmission of Eye-Protective Glasses," by K. S. Gibson and H. J. McNicholas, Assistant Physicists of the Bureau. [Sold only by the Supt. of Documents, Government Printing Office, Washington, D. C., price 10 cents.]

Part of the determinations were made in the physical laboratory at Cornell University and in their report the authors extend their thanks to Prof. E. L. Nichols of that institution for courtesies extended the Bureau in affording facilities to expedite this work, which would otherwise have been greatly delayed. The authors also acknowledge their indebtedness to Irwin G. Priest, who originally planned and initiated this investigation, but was obliged to lay it aside on account of other duties. Acknowledgement is also made to J. T. Filgate, who assisted in observing and computing.

The importance of this investigation cannot be overestimated, and every member of the Section is advised to secure a copy of the pamphlet for study and references. Owing to its length,

it is impossible to submit the report in its entirety to the Section and only its most important conclusions will be transmitted.

In introducing their subject, the authors state:

"It is well known that ultraviolet radiant energy of certain wave lengths, such as occur in the quartz-mercury arc, the iron arc, and many other sources, is extremely injurious to the eye. Excessive brightness in the visible spectrum may also cause temporary or permanent injury; while the intense heat or infrared radiant energy coming from molten glass or metal is also considered by some as being dangerous to the eye.

This danger of injury from such sources undoubtedly depends on both the wave length and the intensity of the radiant energy, but in spite of the great amount of work which has been done on this subject quantitative data with few exceptions are not available. It is only recently that accurate data on the transmission of eyeprotective glasses have begun to be published. The following list comprises all the important previous publications which we have found giving data on this subject.

"In 1911 the Bureau published the spectral transmissions of a few glasses of well-known trade names as determined by P. G. Nutting at the Bureau².

"In 1914 Crookes³ published the results of an investigation in which he made and tested over 300 specimens in the search for the ideal colorless or neutral glass which should absorb all the ultraviolet and infrared. Though he failed to find this ideal glass, he did succeed in producing a colorless glass which absorbed much more of the ultraviolet than ordinary colorless glass, and a blue-green glass absorbing about 90 per cent of the radiant heat. In his paper he gives, for plates of each glass 2 mm. thick, the 'limit of transmission of ultraviolet,' the 'percentage of heat cut off,' the 'percentage of luminous rays transmitted,' and 'the color as registered on a Lovibond tintometer,' but no data are given as to the per

cent transmission at different wave lengths.

"About the same time Luckiesh⁴ measured photographically the per cent transmission from 300 to 500 $\mu\mu$ of nine samples of eye protective glass—one colorless lead glass, three 'smoke' or neutral, one amethyst, two amber, one 'Euphos' and one 'Akopos'—without, however, giving the thickness. A number of spectrograms of these and other eye protective glasses are also given, showing approximately the limit of transmission in the ultraviolet, but again the thickness is usually not indicated. The total transmission factors for the visible are given.

"In a paper on colored glasses Gage⁵ compares the colorless 'Crookes' glass with the 'Noviol' glass manufactured by the Corning Glass Works. Transmission curves and spectrograms, 400-720 $\mu\mu$, of 'Noviol,' 'Noglare,' 'Noviweld,' heat-absorbing and railway-signal glasses are given.

"A paper by Martin⁶ has appeared during the progress of this investigation which gives quantitative data for ultraviolet, visible and infrared transmission of various shades of neutral, 'Crookes' neutral and green shades, 'Fieuzal' and 'Hallauer' glasses. The thickness is given in all cases. He made use of the Hilger sector photometer to obtain his ultraviolet data.

"Coblentz and Emerson⁷ have published considerable data on the infrared transmission of eye protective and other glasses. The samples studied included yellow-colored, 'Crookes' neutral and green glasses, various glasses for absorbing the infrared, such as gold-plated, blue-green (heat absorbing), greenish-brown, black and 'Noviweld' glasses, the thickness being given in all cases. They have also given the per cent transmission of these samples for the undispersed radiant energy from the gas-filled tungsten lamp, the quartz-mercury arc, and the magnetic arc.

"Only the last of these papers supplies extensive data such as are presented herewith for glasses at present on the American market. In some cases comparison of data in this pa-

per with previous data will indicate the degree of agreement obtaining in the spectral transmissions of accidentally selected glasses bearing the same trade name."

Then follows a brief elementary discussion for those unfamiliar with Spectrophotometry, including an explanation of terms used in the paper; the illustration of method for computing the transmission for thicknesses different from that measured; instruments used and specimens studied.

The authors state:

"These specimens are all designated by their trade names. Some of them are of unknown origin, specimens which have been marketed for years under more or less well-recognized trade names. The data given show what may be obtained under one of these names, but, as there are usually so many different shades of the same kind of glass marketed under the single trade name, it can not be expected that duplicates can be obtained merely by ordering by name. However, most of the specimens, especially those of American manufacture, are designated by shade—that is, "A," "B," etc.—as well as by trade name or by number, and in this case it is expected that approximately duplicate samples can be obtained. If accurate reproduction is required, the designation should not be assumed as a sufficient specification; but the oculist or buyer, guided by the data given herewith, may now prescribe or order glasses of specified spectral transmissions, acceptance being subject to test.

The surfaces of these specimens were highly polished and with very few exceptions made plane and parallel to 0.01 mm. They are of a thickness ordinarily used in spectacle lenses. They have been labeled and filed at the Bureau for future reference. In table 1 is given a list of these glasses arranged alphabetically according to their trade names, together with the name of the company, the color, thickness, and other data which will be discussed later."

The results of the investigation were shown by curves in a series of figures

Table 1.—List of Specimens Studied.

Specimen, company's designation	Company	Color	Thickness in millimeters.	Instrument a				Total transmission factor
				H	L-B	K-M	M	
Akapos	King	Yellow-green	2.17	(*)	(*)	(*)	(*)	.79
Amber A.....	A. O. Co...	Yellow	2.13	(*)	...	...	...	0.36
Amber B.....	... do .....	... do	2.13	(*)	...	(*)	...	.57
Amber dark.....	W. & O.....	... do	1.85	(*)	(*)	(*)	(*)	.555
Amber light.....	... do .....	... do	1.93	(*)	(*)	(*)	(*)	.805
Amethyst A.....	A. O. Co...	Purple	2.08	(*)	...	(*)	...	.745
Amethyst B.....	... do .....	... do	2.05	(*)	...	(*)	(*)	.70
Amethyst C.....	... do .....	... do	2.04	(*)	...	(*)	...	.55
Amethyst dark.....	W. & O.....	... do	1.90	(*)	(*)	(*)	(*)	.705
Amethyst light.....	... do .....	... do	1.97	(*)	(*)	(*)	(*)	.805
Arkweid dark.....	King .....	... do. ^b	2.46	(*)	...	...	...	0+
Blue A.....	A. O. Co...	Blue	2.10	(*)	...	(*)	...	.88
Blue B.....	... do .....	... do	2.04	(*)	...	(*)	...	.62
Blue C.....	... do .....	... do	2.05	(*)	...	(*)	...	.35
Blue D.....	... do .....	... do	2.11	(*)	...	(*)	...	.062
Chlorophile	W. & O.....	Yellow-green	1.98	(*)	(*)	(*)	(*)	.65
Chromatic test.....	A. O. Co...	Blue	2.36	(*)	...	(*)	...	.0075
Cobalt blue AA.....	... do .....	... do	2.75	(*)	...	(*)	...	.033
Cobalt blue A.....	... do .....	... do	3.20	(*)	...	(*)	(*)	.026
Cobalt blue B.....	... do .....	... do	1.85	(*)	...	(*)	...	.0085
Cobalt blue C.....	... do .....	... do	1.46	(*)	...	(*)	(*)	.0096
Cobalt blue D.....	... do .....	... do	1.86	(*)	...	(*)	...	.0055
Crookes A.....	W. & O.....	Neutral	1.79	(*)	(*)	(*)	(*)	.84
Crookes B.....	... do .....	... do	1.93	(*)	(*)	(*)	(*)	.485
Crookes A, Wellsworth	A. O. Co...	... do	2.05	(*)	...	(*)	...	.85
Crookes B, Wellsworth	... do .....	... do	2.16	(*)	...	(*)	...	.45
Crown 1.50.....	... do .....	... do	1.68	(*)	...	(*)	(*)	.92
Electric smoke red.....	... do	Red-purple ^b ..	1.82	(*)	...	...	(*)	0+
Electric smoke Y.....	... do	Yellow ^b	2.01	(†)	...	...	...	0+
Euphos .....	... do	Yellow-Green	1.95	(*)	...	(*)	...	.72
Fieuzal	W. & O.....	... do	1.98	(*)	(*)	(*)	(*)	.835
Fieuzal A.....	A. O. Co...	... do	2.13	(*)	...	(*)	...	.665
Fieuzal B.....	... do .....	... do	2.13	(*)	...	(*)	...	.51
Hallauer	W. & O.....	Yellow-green	1.90	(*)	(*)	(*)	(*)	0.48
Laboratory No. 57....	A. O. Co...	Neutral	1.90	(*)	...	(*)	(*)	.91
Laboratory No. 58....	... do	Yellow	2.02	(*)	...	(*)	(*)	.815
Laboratory No. 59....	... do	Blue-green ..	2.13	(*)	...	(*)	...	.32
Laboratory No. 61....	... do	Yellow-green	2.13	(*)	...	(*)	...	.65
Luxfel .....	... do	Yellow	2.00	(*)	...	(*)	(*)	.835
Noviol AA.....	... do .....	... do	1.88	(*)	...	(*)	(*)	.88
Noviol A.....	... do .....	... do	2.06	(*)	...	(*)	...	.87
Noviol B.....	... do .....	... do	2.10	(*)	...	(*)	...	.85
Noviol C.....	... do .....	... do	2.10	...	...	(*)	...	.83
Noviol O.....	... do .....	... do	2.03	(*)	...	(*)	...	.85
Noviol A.....	Corning .....	... do	2.00	(*)	(*)	...	(*)	.865
Noviol A ₁.....	... do .....	... do	2.88	(*)	(*)	...	...	.87
Noviol A ₂.....	... do .....	... do	2.84	(*)	(*)	...	...	.85
Noviol B.....	... do .....	... do	1.95	(*)	(*)	...	(*)	.84
Noviol B ₁.....	... do .....	... do	2.83	(*)	(*)	...	...	.845

Specimen, company's designation	Company	Color	Thickness in millimeters	Instrument ^a				Total transmission factor
				H	L-B	K-M	M	
Noviol C.....	do	do	2.00	(*)	(*)	...	(*)	.825
Noviol O.....	do	do	2.01	(*)	(*)	...	(*)	.865
Noviol O.....	Hardy	do	1.94	(*)	(*)	...	(*)	.88
Noviweld 4.....	A. O. Co.	do	1.89	(†)	...	(*)	(*)	.0315
Noviweld 5.....	do	do	2.16	(†)	...	(*)	(*)	.014
Noviweld 6.....	do	do	2.20	(†)	...	(*)	(*)	.010
Noviweld 7.....	do	do	1.90	(†)	...	...	(*)	.006
Noviweld 8.....	do	do	2.01	(†)	...	...	(*)	.0032
Noviweld 12.....	do	do. ^b	2.08	(†)	...	...	...	0+
Pfund	do	Green	(c)	(*)	...	(*)	(*)	.047
Rifleite	King	Yellow	3.14	(*)	(*)	...	...	.775
Saniweld dark.....	do	do	2.12	(†)	(*)	...	(*)	.0135
Saniweld light.....	do	do	1.82	(*)	(*)	...	(*)	.115
Smoke A.....	A. O. Co.	Neutral	2.10	(*)	...	(*)	(*)	.75
Smoke B.....	do	do	2.14	(*)	...	(*)	(*)	.38
Smoke C.....	do	do	2.13	(*)	...	(*)	(*)	.265
Smoke D.....	do	do	2.03	(*)	...	(*)	(*)	.092
Special Noviweld No. 8	Hardy	Yellow ^b	1.77	(†)	(*)	...	...	.00015
Special Welders dark..	A. O. Co.	Green ^b	2.54	(*)	...	...	(*)	0+
Special welders light..	do	do	1.68	(*)	...	(*)	(*)	.0105
Welders smoke dark..	do	Neutral	1.42	(*)	...	(*)	(*)	.056
Welding glass 1.....	C. E. S. Co.	Yellow	1.98	(†)	(*)	...	(*)	.0034
Welding glass 2.....	do	do	2.32	(†)	(*)	...	(*)	.045
Welding glass 3.....	do	do	1.50	(†)	(*)	...	(*)	.00885
Welding glass 4.....	do	do	1.48	(†)	(*)	...	(*)	.00885
Welding glass 5.....	do	Red	1.87	(†)	(*)	...	(*)	.0027
Welding glass 6.....	do	Yellow	1.97	(†)	(*)	...	(*)	.0705
1.52	A. O. Co.	Neutral	2.33	(*)	...	(*)	(*)	.92
91 B.....	Corning	do	1.97	(*)	(*)	(*)	(*)	.84
124 IP.....	do	Green	2.00	(*)	(*)	...	(*)	.015
124 JA.....	do	Blue-green	2.02	(*)	(*)	...	(*)	.61
391 DD.....	do	Red ^b	1.90	(†)	(*)	...	...	.00012
392 F.....	do	Blue-green	1.90	(*)	(*)	...	(*)	.72

^aH.=Hilger, L-B=Lummer-Brodhun, K-M=Koenig-Martens, M=Martens. An asterisk (*) indicates which instruments were used. A dagger (†) instead of an asterisk means that no transmission was detected from 230 to 500 millimicrons.

^b Color very dense. ° Gold film.

in which the per cent transmissions for different wave lengths were plotted against the wave lengths. By per cent transmission, the authors means that per cent of the incident radiant energy which gets thru the specimen. Those desiring to study these curves will find them in the original pamphlet to be obtained from the Government Printing Office.

The authors state that

"Of the specimens studied, the five kinds which are most efficient as protection against the ultraviolet, while being at the same time nearly colorless in the thicknesses examined, are 'Crookes A' (Figs. 3-4), Corning '91B' (Fig. 3), A. O. Co. 'Lab. No. 57' (Fig. 6), A. O. Co. 'Lab. No. 58' (Fig. 6) and 'Noviol O' (Figs. 7-9). Of these, 'Noviol O' and A. O. Co. 'Lab. No. 58' are the best, but

are not so truly colorless as the other three. Of the slightly colored glasses, by far the best seem to be 'Noviol A' (Figs. 8-9) and 'Noviol A₁' (Fig. 7), as they absorb completely below 410 $m\mu$ while transmitting about 87 per cent of the incident light. It is not thought that the slight color would be at all objectionable for ordinary use.

"A combination of 'Noviol A' (Figs. 8-9) and Corning '124JA' (Fig. 14) is very efficient for eye protection, as it absorbs all the ultraviolet and most of the infrared, and still has high visible transmission. The color is a very light green, and the colors of objects viewed thru it are distorted practically none at all. A gold film on 'Noviol A' glass would also be very efficient, tho transmitting less of the visible than the combination just mentioned.

"The yellow and yellow-green glasses (Figs. 7-13) of a deeper shade are usually good protection against the ultraviolet. The green and blue-green glasses of Fig. 14 are used primarily to protect the eye from the infrared. The 'Pfund' specimen is a gold film between two pieces of what seems to be 'Crookes' glass. 'Smoke' (Fig. 5), amethyst (Figs. 15-16), and blue (Figs. 17-18) or purple glasses are liable to be little better than clear glass as a protection against the ultraviolet. Of the welding glasses (Figs. 19-22), yellow seems to be the safest, as the green or neutral shades are liable to have transmission bands centering near 395 $m\mu$, which may extend a considerable distance into the ultraviolet."

Observations on transmission factors follow and sample transmission curves are given with all values plotted, illustrating the kind of agreements and disagreements obtained on the different instruments employed in the various tests.

In an appendix are found forms suitable to be used in the specifications of eye protective glasses. The authors point out that

"It is desirable that those who wish to specify eye protective glasses should have at hand certain standard type forms for such specifications. The following forms, separately or in combination, as the case in hand may require, will be

found, in general, suitable and adequate for this purpose:

"1. *For Protection from Ultraviolet.*—The transmission shall not be greater than 0.01 for radiant energy of any wave length less than 406 millimicrons."

"2. *For Protection from Heat.*—The total transmission for radiant energy from a source having the spectral energy distribution of a complete radiator ('black body,' Wien equation) at 1500° absolute shall not be greater than....."

"3. *For Protection from Intense Light while Allowing Sufficient Light for Work.*—The total light transmission for light of equal energy at all wave lengths shall not be more than.....nor less than....." This would approximate closely the total light transmission for sunlight. In some cases it might be desirable to make the specification in terms of the known spectral energy distribution of the standard acetylene flame or other source.

"The blank spaces in the above forms should be filled as found desirable in particular cases. Satisfactory glasses should be selected by trial under service conditions. The measured transmissions of these selected glasses will then serve as data for filling the blanks in the above forms."

The practical application of this form will become apparent with the publication of "A National Safety Code for the Protection of the Head and Eyes of Industrial Workers," with which the Bureau of Standards has been engaged for some years past, and in the compilation of which your committee has been referred to for advice and cooperation. This excellent piece of work of the Bureau will soon be finished and is also recommended to the members of the Section for their careful consideration.

In concluding this report, it may be of interest to recall that the investigations made by Drs. C. E. Ferree and A. G. Rand regarding the effects of various forms of illumination under different modes of distribution were initiated and to a degree guided by our committee, of which Dr. Ferree was a member.

Respectfully submitted,

WM. CAMPBELL POSEY,
Chairman.

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ABSTRACTS

Rinkes-Huygen, A. C. Treatment of Gonococcus Conjunctivitis. Doctorate Thesis, Amsterdam.

The thesis begins with a historical survey of which a few points can be mentioned. In 1807 Gibson advocated treating vaginal disease of the mother during pregnancy, to remove during parturition the secretion from the vagina; and to wash out the eyes of the new-born directly with a fluid for removal of the materia peccans. To these precepts attention was given only when Piringer distinctly proved that conjunctivitis gonorrhoeica originates only if secretion from a diseased mucous membrane has come in some way in the eye.

Credé's merit is the application of a 2% solution of silver nitrat to all the newborn in the clinic. Cramer found in 300 cases that instillation of 2% silver nitrat is always followed by reaction. In 96% secretion appeared, which in 23% had not ceased after 5 days. Experience has taught that for prevention of corneal lesions it is better not to drop on the cornea, but at the inner angle; and to replace the 2% by the equally efficacious 1% solution.

Potassium permanganat 3% was recommended in 1882 by Stellwag. In 1892 Terson irrigated the conjunctival sac with 1:2000 or 1:5000, and in 1894 Kalt recommended free irrigations with 1:5000. In 1914 Fehr published statistics of treatment consisting of rest in bed, ice compresses as long as the cornea was intact, and irrigations with the permanganat every hour, even during the night.

Once a day the palpebral conjunctiva was treated with 1% silver nitrat, and atropin salve and lenicet salve were

put in the conjunctival sac, for protection of the cornea. With severe chemosis the conjunctiva was scarified; while with corneal ulcers if necessary cauterization and the conjunctival plastic operation, after Kuhnt, were done. The sound eye was protected by a bandage, and this was renewed daily until the secretion of the diseased eye had ceased and no gonococci could be demonstrated in the secretion.

Between April, 1907, and March, 1914, 53 eyes of 45 patients, of which 36 were adults or older children were treated. On admittance 31 eyes had the cornea intact. During the treatment 25 corneas remained clear; 6 eyes had corneal complications, 4 of which were cured entirely, and 2 got leucomata (1 without useful vision); 22 corneas showed corneal complications, in 6 the cornea was destroyed, 9 were discharged with vision 1/2 to 1.; 5 with corneal maculae but useful vision; 5 with reduced vision, but can be probably improved by operation, 1 with phthisis bulbi and 2 were enucleated, 72% are therefore cured, 6 have retained useful vision and 17% have been lost.

In the Amsterdam clinic the following treatment was applied: as long as there was secretion the patients remain in bed, and the nonaffected eye is protected by a watch-glass. The affected eye is often cleansed, in very serious cases even every 5 minutes, when the eye is slightly opened, for removal of the pus thru small motions of the eyelids. For cleansing usually 1/5000 sublimat is used. Twice daily, or more often, the eye is irrigated with Straub's syringe, with 1/1000 potassium permanganat; and if the condi-

tion does not improve the eyelids are turned and treated with 2% silver nitrat. If this does not reduce the swelling and redness of the conjunctiva copper sulphat in substance is applied. Atropin is used with corneal complications. Patients are discharged when the conjunctiva becomes thin and smooth, and gonococci can no longer be demonstrated.

Of newborn children 24, with 48 affected eyes, were treated without irrigation, only with silver nitrat and cleansing. Of these 27 corneas were intact, 7 of which had complications (twice in both eyes), 6 got large maculas, in one the opacity was moderate. The other 21 corneas were affected, of them 6 became clear, 9 were discharged with moderate maculas, and 6 with large maculas. In 22% of eyes with intact corneas an important diminution of the vision took place.

Of 21 cases with corneal complications, 5 retained useful vision. The treatment of uncomplicated cases was 3 weeks or shorter in over 50% and the same for 29% of the complicated cases. But for about 57% of the latter it was longer than 5 weeks. Under this treatment 211 eyes of the new born and 59 eyes of adults and older children were observed. In the new born 132 eyes with intact cornea 10 had corneal complications (one traumatic, 3 times insufficient care, and twice general poor condition); 9 times the cornea became perfectly clear or only small peripheric maculae remained. Corneal complications occurred in 79 eyes, 3 with perforation. The cornea became clear in 47. Of the older patients 31 corneas were intact, among which corneal complications appeared twice (one discharged with V. 3/4, and one with 2/3). There were 26 eyes that came with complications (6 with perforating ulcer). In 19 the cornea cleared up, or slight maculae remained, 3 times central maculae ($V=1/6$). The eye was blind or about so on discharge in 6. Once exenteration was necessary. Good vision remained in eyes with affected cornea in about 70%.

The writer does not like to recommend lenicet salve, because the illu-

sion, that one uses a specific, may prevent the good care, which the other method asks for. Heat applications, recommended by Goldzieher in 1911, invite further trial. One must be sure that the conjunctiva comes in contact with the watery vapor of the wished for temperature. With vapor of a lower temperature the aim of killing the gonococci will not be reached; while vapor of too high temperature may damage the eye. In the last year it has been tried to elevate the temperature in the conjunctival sac with diathermia: an alternating current of very high frequency and tension goes thru the organ. The frequency oscillates between 1 to 6 million in the second; and a current of $1/2$ to 3 ampères and even more can be used without damage. In ophthalmic practice one will do well not to use a current stronger than $1/2$ ampère. Five cases of conjunctival gonorrhea were treated with diathermia. In the first case, which was on the way to recovery, when the diathermia treatment was applied, the secretion ceased after 4 days, and the eyes became quiet. Distinct proofs of acceleration of the cure are not present.

A similar conclusion must be drawn in the second case; which healed no quicker or better than other cases, which were treated without diathermia with frequent washings and permanenate irrigations. The third case, which was taken up with severe acute inflammation; after 3 days with diathermia distinctly was improved. The gonococci, however, were not killed, they could still be demonstrated after 24 days. In the fourth case neither the diathermia nor the injection of typhoid vaccine had any distinct result. The fifth case had a very favorable course; it is difficult to know the influence of the diathermia and the vaccine, but the physicians were convinced that the therapy produced the favorable change.

The results of the diathermia depend on the temperature which the patient will stand, and this will be insufficient in sensitive patients for damaging seriously the gonococci in a short time. The heat must be controlled and ap-

plied a sufficiently long time—at least 10 to 15 minutes—if conclusions can be drawn from the effect, credited to this therapy. The temperature cannot be controlled objectively; and this excludes treatment of the new born.

The chemotherapy (Roemer, Loehlein and Gebb) has not proven valuable, and the same can be said of trypaflavin. In two clinical cases trypaflavin was used without apparent success. It induced the writer to try its effect on rabbits' eyes. If during two successive days with intermissions of at least 3 hours only 6 times one drop of trypaflavin 1% is dropped in the conjunctival sac of an adult rabbit, the cornea shows slight lesions, while the same treatment with $\frac{1}{2}\%$ distinctly affects the cornea of the young rabbit. She finds no reason to recommend this remedy.

Under albumin therapy the writer considers together all those methods, where albuminous substances as milk, normal or antitoxic serum, or auto—or heterovaccine is applied, externally as wash or irrigation, or as parenteral, subcutaneous, intramuscular and intravenous injections. These all are still in the experimental stage. We know nothing about the essence of this therapy and the factors are unknown why in one case a favorable result is reached and not in another. The dangers of injection of foreign albumin are the anaphylactic symptoms. Without a great probability of therapeutic success and the certainty that the body will not undergo a permanent harm, the injection of complicated albumins, as milk and serum, is not allowed. Here also exists the possibility of fat embolism with milk injection, and local necrosis at the place of injection with both. As long as the therapeutic effect is so very uncertain the albumin injections are not allowable, because at the present stage of science we use a weapon, the effect of which we do not know.

Renaud in 1911 mentioned cure in different local infections with injection of typhoid vaccine. Paul von Szily and Aladar Sternberg used typhoid vaccine in acute ophthalmoblenorrhoea in

1917. Haab also published favorable results in the next year. This justifies further examination in this direction. Three cases received these injections in Amsterdam: the very favorable course in the first, and the apparent even if only temporary improvement in the third, have disposed the writer favorably; they justify continuation, but can never be a reason to neglect the approved methods of care and treatment.

The therapy with milk injections cannot claim to be trustworthy therapy. With its possible dangers it is far less to be recommended than the vaccinotherapy, even if the future still has to demonstrate the value of the latter procedure.

E. E. B.

Santos Fernandez, J. Congenital Detachment of Retina. *Revista Cubana de Oftalmologia*, 1920, No. 2.

This affection is not frequently seen congenitally. The author has only seen four cases, in over 62,000 eye patients, two of them 28 years ago and the other two very recently. The last cases were seen in the same month, both in young girls, in one of them the detachment was bilateral. One of these cases was diagnosed as glioma of the retina by a colleague, and the author was really at first in doubt. But after obtaining the history of the case, the diagnosis was established, and enucleation was very emphatically condemned. The subsequent course of the disease confirmed the diagnosis.

The second case was in a young boy, a month and a half old, the last of six children, all the others being well. The parents noticed since birth a white veil in both pupils, and the author was able to diagnose detachment of both retinas.

Case third, was of a girl three years old, whose father noticed since she was able to see, that there was a yellowish reflex in her right eye. This was diagnosed three years before as "cancer," by a rural practitioner; but it was a case of unilateral detachment.

Case fourth, another girl, fifteen days after her birth, the family noticed something strange in both eyes. The same reflex as in the three other cases.

The ophthalmoscope revealed the bilateral detachment.

Kennon, B. R. Detachment of Retina in Three Children of a Family. *Virginia Medical Monthly*, v. 47, p. 175, July, 1920.

Two brothers and a sister in a family of five children were affected with detachment of the retina, altho the family history was otherwise negative.

There was no myopia, or evidence of other ocular disease, except that the girl, aged 15, had floating opacities and fluid vitreous in her other eye. One brother gave an indefinite history of injury while playing football six weeks before. The other had been struck in the left eye by an oyster shell some weeks before. In the other brother and the sister it was the right eye that was affected.

Treatment produced no permanent improvement, altho evacuation of the fluid by scleral trephining caused temporary improvement in the most clearly traumatic case.

E. J.

von Szily, A. Spontaneous Internal Fistula of Lacrimal Sac. *Klin. M. f. Augenh.*, v. 64, January, 1920, p. 31., ili.

Von Szily introduces this internal fistula as a new type of disease of the tear passages, leaving it to further investigation to clear up the pathogenesis of this form of fistula. Two cases are described, in which, without preceding phlegmon of the tear sac a fistula had formed with a stenosis at the place of predilection opposite the middle turbinated body thru which the irrigation fluid ran into the nose.

The anatomic relations of the fossa lacrimalis to the lateral wall of the nose and to the accessory sinuses, and the pathogenesis of the fistula interna are discussed in detail. There are 2 modes of pathogenesis suggested: Empyema of the ethmoid, which erodes the medial wall of the lacrimal sac, besides tubercular changes. Or the inflammation may start from the tear sac. Enlargement and diverticulum of the sac, as well as simultaneous congenital or spontaneous resorption.

Openings of the lacrimal bone, as frequently observed in older people, may contribute. Stenosis of the duct is present in a part of the cases, but is not an essential preliminary to the origin of the fistula.

The fistula interna, may, especially in stenosis of the duct, by sufficient drainage of the secretion to the nose, finally lead to spontaneous healing of the dacryocystitis. Spontaneous communications between the medial wall of the tear sac and the nasal cavity may arise at the site of the endonasal operation of Polyak-West. In the majority of cases, however, extirpation of the lacrimal sac; and in established ethmoiditis, opening of the ethmoid cells are indicated.

The diagnosis of fistula interna could only be made by means of Roentgen rays after injecting a shadow giving mass into the lacrimal passages, for which von Szily used at first bismuth and later on impalable oxid of thorium, triturated in liquid paraffin. In case I, the outflow of the irrigation fluid and the fistula could be directly observed. Two plates illustrate the skiagraphs.

C. Zimmermann.

Duane, A. Theoretical and Practical Points in Refraction Work. *Archives of Ophthalmology*, v. 49, 1920, p. 349.

Some of the theoretic considerations brought out in this paper cannot well be abstracted, but the following may be taken with regard to the significance of the cardinal points. He says:

"1. The position of the posterior focus with relation to the retina determines whether the eye is emmetropic, hypermetropic, or myopic.

"2. The position of the posterior nodal point with relation to the retina determines the size of the retinal image and has, therefore, a bearing on the apparent size of objects and on visual acuity.

"3. The main effect of glasses placed in front of the eye is not to change the refractive power of the latter but to shift the position of the cardinal points—putting the posterior focus of the eye (F) on or off the ret-

ina, and changing the position of the posterior nodal point (K) with relation to the latter.

"4. If a glass is placed at the anterior focus of the eye—and this is the regular place for correcting glasses—it makes absolutely no change in the refractive power of the eye. That is, a +10 D. lens placed 14 mm. in front of the cornea has no effect whatever on the posterior focal distance of the eye which remains 21.1 mm. What is does do is to shift the posterior focus of the eye and also the posterior nodal point of the eye some 3 mm. forward and thus exert a marked and determinate effect on the clearness of retinal images.

"5. On account of this and other properties, the anterior focus of the eye is the point where we should place glasses to be worn, where we should place the ophthalmoscope in applying the direct method, and from which we should make our measurements in determining the far point and near point of accommodation."

Usually in calculating the constants of the eye, the effect of the posterior surface of the cornea is neglected. It is not, however, a negligible quantity. Thus if we use the latest measurements of Tscherning in calculating the constants of the eye, the difference corresponds to a difference of a whole diopter in refraction.

Regarding the size of the pupil, Duane points out, the pupil as we see it thru the magnifying lens formed by the cornea is about one-ninth larger than the actual pupil. But this apparent pupil, "inlet" pupil as Abbe calls it, measures accurately the width of the beam of rays that can find its way thru the actual pupil. That is, a pupil really 4.5 mm. in diameter, and which appears to us to be 5 mm. in diameter will admit a beam of rays that occupies a circle of the cornea that is 5 mm. in diameter.

Opposed to this "inlet" pupil is the "outlet" pupil, or image of the pupil formed by the crystalline lens. It is this figure which really forms the base of the cone of rays directed toward the retina, and determines therefore the

size of diffusion images. It is, however, very little larger than the pupil itself.

As to change of refraction in the development of the eye, he says: We often get a wrong conception of the change that takes place in the refractive state of the eye between infancy and adult life, when we think of it as change caused by simple elongation of the eyeball, converting a primitive axial hyperopia into emmetropia and in many cases into myopia. A moment's consideration shows that this is a very partial representation of what takes place. The infant's eye is so short that, built on anything like the refractive scheme of the adult, it would have an axial hyperopia of 20 D. As in reality it is usually hyperopic only 2 or 3 D. at most—and sometimes not hyperopic at all—it is evident that in the early years of life we have a combination of two factors—an axial shortening sufficient to cause a hyperopia of 20 D. and an excess of curvature sufficient to cause a myopia of some 18 D. This excess of curvature must be located in the lens, since the cornea is not very much more curved in the infant than in the adult. As the child grows, two opposing processes occur simultaneously. The excessive curvature of the lens diminishes, causing a reduction of the curvature myopia; and the eyeball elongates, causing a reduction of the axial hyperopia. Usually, but not invariably, the latter process predominates so that the eye as a whole tends to grow less hyperopic—strives to become emmetropic. It is rather remarkable that a process composed of two opposing and simultaneously diminishing factors should not present more variations than it does, and that there should be on the whole a steady progress toward emmetropia—even if this does often fall short of the mark or overshoot it.

Among the practical points emphasized in this paper, Duane says, "In the great majority of cases the refraction of the eye cannot be determined with certainty without the use of cycloplegics. This statement applies to astigmatism as well as to hyperopia and to

both more than it does to myopia." There is also necessity for making a careful test of the eye in its natural condition, and in a very large number of cases, by so doing we may arrive at the same result as under a cycloplegic. But as one can never be sure in any given instance that this will be the case, and as in some cases there is reason to think that the results would be the same they have turned out to be different, we should give ourselves and the patient the added certainty that the use of the cycloplegic affords."

To the objections urged against the use of cycloplegics, the above facts meet the claim that they are useless.

That cycloplegia often fails to disclose the true refraction, Duane cannot corroborate from his experience, if cycloplegics are used in the proper strength and if their action is checked by the accommodation tests. Once in a while the tests are contradictory or unsatisfactory under homatropin and atropin must be used.

As to the danger of cycloplegia causing glaucoma, this has appeared but once in his entire experience. "Furthermore, an eye which develops glaucoma under a cycloplegic is an eye which is going to develop glaucoma anyhow. It is not an unmixed evil then if it develops it right before our eyes. We can usually control the increase of tension with eserine, or, failing that, with a paracentesis; and then do the iridectomy that such a case should in any event have."

Contrary to what is often stated, he has found that it is even more necessary to use a cycloplegic in middle life than in youth. Those of middle life often relax the accommodation imperfectly or with difficulty, and are often rather resistant to cycloplegics. The more flexible ciliary muscle of youth usually relaxes more readily. He uses a cycloplegic in practically all cases up to forty-eight, and sometimes after that age.

In a previous paper he has cited nineteen cases of patients between forty and forty-nine, in whom homatropin had disclosed latent hyperopia of anywhere from 0.62 to 3.00 D. and

latent astigmatism of from 0.25 to 1.00 D. What was particularly significant was that sometimes considerably more error was latent in one eye than in the other, so that no conceivable equal addition to the manifest correction would have given a glass satisfactory to both eyes.

To determine whether or not we get complete cycloplegia we should systematically employ the accommodation tests, taking the accommodation before and during the instillations until the range has been reduced to below a diopter. The period of complete cycloplegia occurs at a time varying anywhere from forty minutes to two hours or more. Tests taken when the accommodation is not thus completely relaxed are apt to give wrong results.

When there is a large disagreement between the precycloplegic and the cycloplegic findings a postcycloplegic test is insisted on. This should be made not less than four days after the cycloplegic, since some traces of the latter often persists for this length of time, as shown by the accommodation tests; and if we make the test too soon we are likely to prescribe a glass that will be uncomfortably strong or one that will blur the distant vision. Duane prefers to make his postcycloplegic tests not less than a week after the cycloplegic, particularly when it is a question of giving a presbyopic glass based on the cycloplegic findings. Here we wish to be particularly careful that the full power of accommodation has returned.

Careful repeated tests should be made of the accommodation and muscles. Insufficiencies of accommodation are of great importance at all ages, tho particularly in the young, and if they are not recognized and treated, the results of correction of the refraction may be disappointing. Contrary to the view expressed by Hess and others, insufficiency of accommodation is of significance and can be made out in persons of the presbyopic age.

The determination of the muscle balance for far, and especially for near points, is of great significance in our refractive work. In the presence of a

convergence excess we crowd our hyperopic correction. In the presence of a convergence insufficiency, evidenced by a marked exophoria for near and a remote convergence near point, we are careful not to give a strong presbyopic correction, which in just these cases is badly tolerated. In cases of hyperphoria we may have to add a vertical prism or in certain cases a prism passer to insure comfortable vision.

Among factors governing the treatment of a refractive error Duane mentions the following: the age of the patient, the vision, the amount and kind of use to which the eye is put, the symptoms and their obvious relation to the use of the eye, the accommodation and the associated muscular conditions, and the general symptoms and general condition of the patient.

He sums up the handling of refraction cases in these two maxims: "First, let us find out all we can about the eye we are treating and the symptoms of which they are a part; using to this end every means that experience has proved to be helpful, never doing the work in a hurry, and remembering always that this work of all others requires patience, thoroughness and accuracy.

"Second, let us constantly bear in mind the fact that we are treating patients, not eyes; we are handling human beings, not machines; and that we cannot do our best work unless in each case we put ourselves in touch with the individual man before us, showing sympathy for his troubles, consideration for his infirmities, and an understanding mind to take in all the physical and mental factors which may affect his outlook on life and determine his need for refractive or other correction."

E. J.

Gonzalez, Jose J. Complicated Eye Strain and Similar Conditions. *Revista Cubana de Oftalmologia*, 1919; p. 553.

In the course of the past twenty years, the author has seen a large number of cases with new symptoms of eye

strain; and some others that are called by him, the equivalent of eye strain.

In the first group of cases the author has seen, hyperthermia and delirium as well as alternating paralysis, and even attacks of apoplexy, complicating the ordinary symptoms of eye strain. Another not very uncommon complication seen by the author is aphasia, four cases of that complication having been observed by Gonzalez. Other cases have had some subjective disturbances of the sensibility, and in still others there have been seen amnesias and hypermnnesia or hyperimagination. Some of the cases observed have had some ocular disturbance, like painful feelings, ocular paralysis and oculo-sympathetic symptoms; and in some others the visual symptoms have been more marked, this subgroup of cases forming the majority of the cases of what is generally called eye strain, in many of which there was some form of scotoma.

In the second group of cases, those called by Gonzalez, "equivalents" to the eye strain, there were periodical attacks of gastric, nasal, and other troubles, like vertigo, pseudoangina pectoris and pseudoepilepsy. Among the chief symptoms observed were a pseudocoryza, painful deglutition, marked reddening of the lobe of the ears, restlessness, tachycardia, pains in the spinal region, and at other times diminution in the frequency of the pulse.

The author believes that all the facts speak in favor of the vasomotor origin of the eye strain in many of the cases mentioned; and that these vasomotor disturbances have a still undefined relation to the sympathetic. The periodic irritation of the sympathetic is probably due to some autointoxication.

These intense symptoms complicating eye strain are in the opinion of Gonzalez, a neurosis of the cervical sympathetic, due to some autointoxication, whose wide variety of symptoms and whose true character could not be exactly explained until the exact physiology of the glands of internal secretion is known.

F. M. F.

Rönne, Henning. A Form of Non-syphilitic Parenchymatous Keratitis.—*Hospitals tidende*, Vol. 63, No. 11, p. 16.

The author presented 2 case histories of parenchymatous keratitis, both in adults, in which no suspicion otherwise existed of syphilis, Wassermann negative, each running a course of 4 or 5 months, with recovery. One case gave a history of some form of multiple joint affections, and the other of a series of light attacks of iritis.

D. L. T.

Hueber, A. A. Transverse Muscle of Orbit. *Royal Academy of Sciences, Amsterdam*, Nov. 30, 1918. Part 27.

A. A. Hueber found this muscle in both orbits, but differing from the case described by Bochdalek (1868).

In the left orbit, the muscle arose from the anterior part of the ethmoidal plate about 2 mm. behind the trochlea, as a flat tendon about 7 mm. in width. The tendon fibers quickly merged into muscular fibers, while laterally the muscle became smaller and rounder, being only 2 mm. broad when it passed at right angles below the superior oblique. Muscle fibers coming from the medial border of the levator bend medially and join the transverse about 1 cm. from the medial orbital wall, causing it to become broader and flatter. Farther laterally the transverse pierces the levator as symmetrically so, that only a small bundle, about 3 mm. in width, passes under the transverse muscle, the major portion being above. At their crossing the transverse measures about 4 mm. and the levator about 10 mm. Laterally from this place of crossing the transverse becomes a thin flat tendon, which is attached to the lateral orbital wall, below the lower border of the lacrimal gland.

After the crossing, the levator divides in the usual way into a superior and inferior part; but the relations of the inferior part deviate somewhat from the normal. It forms a strongly developed portion of smooth muscle, the superior tarsalis muscle, having a

lateral border about 3 mm. long and fused with the capsule of Tenon. This inferior part continues normally and is attached at the upper margin of the tarsus. The medial part has the same points of attachment as the superior, then at this side both parts are connected. The lateral part had a larger extension, reached further posteriorly and connected with the lateral extension of the transverse muscle, and both form a tendinous extension attached below the lacrimal gland on the lateral orbital wall as a flat tendon about 20 mm. broad, which was also fused with Tenon's capsule. The chief portion of the orbital part of the lacrimal gland was found on the tendinous extension formed by the transverse and levator; while a small part stretched forward over the lateral border of the superior part of the levator. The conjunctival part of the lacrimal gland was present between the two parts of the levator.

The right transverse muscle was more developed than the left, and ran more below the levator. Here it appears without other abnormal muscles, so that there is no gracilis as in Bochdalek's case. Its contact with the levator cannot be called intimate, since no fibers of the transverse bend forward, the connection between the fibers of the transverse and the levator is not inseparable, and we cannot say the levator is pierced by the transverse since only a few thin fibers of the levator pass under it. The chief points of similarity are the connection of the inferior part of the levator, with the capsule of Tenon, and the relation with the lacrimal gland.

The innervation of the transverse could not be determined because the covering of fat had been removed in both orbits before the muscle was found. Hueber does not share Macalister's opinion that the transversus should be a dislocated deep palpebral part of the orbicularis, since the connection of the transverse with the levator is too important.

E. E. B.

Howard, H. J. A Uniform System of Eye Tests. The China Medical Journal, May, 1920.

The value of comparing results of any kind is proportionate to the uniformity of methods applied in obtaining those results. When different forms of apparatus, different tests, and a different application of the same tests are used to determine the respective ability or condition of certain ocular functions, the task of correlating the results is almost hopeless.

It is not anticipated that we shall undertake to perform routinely all the tests suggested. But it is hoped that they may constitute the basis of many of our examinations.

OUTLINE OF TESTS.

1. Inspection. Bright daylight preferable; record only pathologic conditions. A. Lids. B. Tear sacs and puncta. C. Conjunctivae. D. Corneae. E. Pupils: 1. Size. 2. Equality. 3. Shape. 4. Reaction to Light and Accommodation.

F. Eyeball: 1. Tension (Waine tonometer). 2. Shape. 3. Nystagmus.

G. Anthropometric measurements. (Record in mm. These measurements are important from standpoint of research.) 1. Interpupillary distance (see VI). 2. Amount of exophthalmos. 3. Distance between the two internal canthi. 4. Distance between internal and external canthus of each eye. 5. Horizontal and vertical diameters of cornea. 6. Development of an epicanthus or a Mongolian fold, i. e., either none, slight, moderate, or pronounced.

II. Visual Acuity. R. E.
L. E.

III. Manifest Refraction.

R. E. Vision
L. E. Vision

IV. Accommodation. (With distance correction on, measure in diopters from the anterior focus of the eye, which is 11.5 mm. in front of the cornea; use the Prince rule and the Duane disc; test each eye separately.)

V. Near Point of Convergence. (With emetropic correction on, or if subject is presbyopic with near correc-

tion on, measure in mm. from the center of rotation of the eyeball, i. e., 25 mm. must be added to the measurement made from the anterior focus.

VI. Interpupillary Distance. (Measured in mm. while looking at distance.)

VII. Angle of Convergence. = $\frac{1}{2}$ interpupillary distance $\times 100$ \div 3
near point of convergence

VIII. Binocular Single Vision. A. Near. 1. Hand stereoscope and stereoscopic picture test. 2. Or bar reading. B. Distance. 1. Have patient look at small spot light with a red glass before one eye. 2. Or use six meter stereoscopotometer test. This tests not only binocular single vision but also depth perception and judgment of distance. Important in testing applicants for aviation service.

IX. Ocular Movements. A. Maddox rod screen test, or the screen and parallax test. (Record deviation in prism diopters.)

1. At 6 meters: Esophoria or esotropia..... Exophoria or exotropia.

R. Hyperphoria or Hypertropia....
L. Hyperphoria or Hypertropia.....

2. At 33 cm. Esophoria or esotropia... Exophoria or exotropia...
B. Prism convergence power at 6 meters. C. Prism divergence power at 6 meters. D. Prism sursumvergence power at 6 meters. E. Prism convergence power at 33 cm. F. Associated parallel movements.

X. Central Color Vision. (Jennings' self-recording test is suggested.) Each eye separately.

XI. Fields of Vision for Form and Color. Good daylight or artificial light. R. E..... L. E.....

XII. Refraction. (Homatropin or atropin cycloplegia if possible; if not, employ fogging method.) Each eye separately. A. Total latent error; B. Trial case result with vision. C. Amount of presbyopia. D. Glasses prescribed: Distance. Near.

XIII. Ophthalmoscopic examination. (Record every pathologic condition.) A. Media—cornea, aqueous including depth of chamber, lens, vitre-

ous. B. Iris. C. Disc. D. Blood vessels. E. Retina. F. Choroid.

XIV. Diagnosis or Summary of Pathologic Conditions.

E. J.

Jess, A. Determination of the Position of and Removal of Foreign Bodies After Penetrating Injuries of the Eyes. Zent. f. d. ges. Ophth. u. i. Grenzgeb, v. 3, 1920, p. 1.

In contrast to peace time injuries war time foreign bodies are usually jagged and of irregular form. Their magnetic quality is dependent on the material used in making the shell, grenades, etc., from which they come. Not all foreign bodies are magnetic or even metallic, as the war caused a large number of injuries by pieces of stone, grains of sand, and splinters of wood and glass. If the condition of the eye is not such as to permit an ophthalmoscopic examination, roentgenography should be used to determine whether or not the object is within the eye; in spite of any possible danger of in-

jury by X-rays to the eye or neighboring structures.

The author describes several ways of determining the position of the foreign body either by specially constructed apparatus, or by observation of the position of its shadow when the eye is turned in different directions. Even with the best method and the greatest care, particles were sometimes not found, as many of them were very minute. The sideroscope should be used in such cases, altho it merely proves the presence of iron and not its location in the eye. The giant magnet should also be used, the presence or absence of pain being a strong diagnostic aid. Since siderosis develops more rapidly in war wounds than in peace, early removal of the foreign body is imperative. This is more difficult than in peace injuries, because the terrific force of the penetration often embeds the particle in the tissues, and this is made more serious by their jagged outlines. The article is chiefly a review of the work of other men, and closes with an extensive bibliography.

C. L.

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GLAUCOMA.

The statement that "glaucoma is increased intraocular tension with the causes and results of such increase," reflected fairly well the general understanding of it twenty years ago. The meaning of the word had evolved slowly, from blindness with a greenish, shining, dilated pupil, thru appreciation of exacerbations and inflammatory attacks, to some understanding of increased intraocular pressure and a search for the causes and mechanism of such increase.

It was thought that if only we could learn to recognize the beginnings of the increase, perhaps causes might be removed and the disease controlled. The tonometer worked out by Schiötz proved a practical clinical instrument. It did help us to recognize slighter changes of intraocular tension, and with greater certainty and accuracy to measure their amount. Our knowledge of intraocular pressure was extended and made more exact; but this has only added to the number and complexity of the problems we have to solve with reference to glaucoma.

From the use of such an instrument, we soon learned that its readings, valuable as they are, do not tell us the absolute intraocular pressure. But when compared with previous readings from the same eye, they tell with great certainty of the direction and extent of changes in pressure; and when compared with those of the fellow eye they indicate with great probability the differences of pressure between the two. Still they cannot be regarded as showing the exact number of millimeters of mercury of the hydrostatic pressure to which the interior of the eye is being subjected.

Nor has the tonometer settled the limits of normal intraocular pressure, either absolute in millimeters of mercury, or in readings of the instrument. We have attained a good idea of about what the pressure is in most normal eyes; but there is still reason to ask, does it vary normally within narrow limits, like the body temperature, or more widely like the blood pressure or the pulse rate?

Again, we have learned with regard to intraocular tension that a symptom

is not a disease; and no symptom is pathognomonic. Simple glaucoma can exist without increased tension; and the search for suspected periods of slight temporary increase in such cases has only added to the confusion; since such increases if they exist are quite within the normal limits as found in other eyes.

On the other hand, very striking increase of intraocular tension, pressures of 50, 60 or even 70 mm. of mercury, as such pressures are commonly described, may be found in connection with uveitis or other uveal disease; and the tension found subsequently drop quite within normal limits of 20 to 30 mm.; and the eye becomes and remains comfortable with recovered vision, and with no sign of glaucoma even after several years. Evidently we can have increased tension without glaucoma, if by glaucoma we mean a disease that tends to persist and become progressively worse until it destroys sight.

Changes in our knowledge of the significance of increased ocular tension must change our ideas regarding treatment. If the eye is going to return to normal tension without it, an operation that immediately gives relief from pain, must seem to have a very satisfactory effect; and without careful consideration may be taken to have a permanently curative effect that does not belong to it. On the other hand, the same operation, giving equally prompt relief in a case with no tendency to permanent recovery from the uveal disease that underlies the increase of intraocular pressure, might easily be ranked as a failure. Its real value being that it simply gives temporary relief which allows spontaneous permanent recovery in one case; while in the other the tendency to spontaneous recovery is lacking.

The number of papers relating to glaucoma that have recently appeared in the literature is an indication of much thinking about this subject, that is being done also by ophthalmologists who do not write about it. However, inconclusive most of these papers may be, they serve to keep thought stirring

with regard to it. By reviewing the ratiocinations of others one is often able to get a more secure grasp of the subject in his own thinking; and some day a new fact introduced into this thinking will crystallize it, giving solid positive knowledge in place of the mixture of unrelated facts and speculation. Best of all, discussion of possibilities may stimulate one to determine the fact, by closer observation or carefully devised crucial experiment.

E. J.

BINOCULAR DISCRIMINATION OF DISTANCE.

Since the war and the examination of candidate flyers the ophthalmologists of America have become more interested in the problem of binocular single vision. It seems that the study of its literature should be made possible for those who cannot read the original Dutch article, to which I have, more than once, had occasion to refer, by Dr. G. J. Schoute, reporting investigations made with Brooksbank James' instrument.

Schoute published in 1910 his article on "Binocular Vision" in the *Nederl. Tydschr. v. Geneesk.* where for the first time attention was called, outside the British Empire, to James' instrument. I find no reference later in the literature until the writer's paper before the ophthalmologic section of the A. M. A., in 1917. The only change Schoute made in the instrument was that he used medium thick white threads, instead of the wooden pins. Because the observer did not look alone at the distance of the two broad rods; but also at their apparent thickness; and it was not easy to keep the illumination alike on the two rods.

James had mentioned the influence not only of the visual acuity but also of the pupillary distance. Schoute examined 82 persons, who had in each eye vision = 10/10, and orthophoria with the Maddox rod; 40 cases with the same vision and 1° esophoria, and 59 with exophoria 1°. They all had about the same binocular vision. He arranged a table of these 181 cases ac-

cording to the length of the base line, the only thing in which they differed.

The averages of those columns, which contained enough observations, show small differences roughly proportional to changes of the base line. The larger the base line, the better the binocular vision. Seen from 5 meters, the average of differences of distance in centimeters, from these two threads, that could be recognized was:

Base line less than 60 mm. 4.05 cm.

Base line 60 to 64 mm. 3.15 cm.

Base line 65 mm. or over. 2.60 cm.

Hence in the application of this eminently practical method, account should be taken of the length of the base line.

To make this method clinically useful it is necessary to search for the causes of the individual differences. Schoute could not give anything positive. He only found the wider separations, pointing to a poor binocular vision, nearly always in children. Therefore an investigation of the influence of age on binocular vision should be undertaken.

Another point in his table is the remarkably large difference between the theoretically supposed acuteness of the binocular vision, and the results practically found. The binocular vision is on an average three times as sharp as was expected. Among another 277 cases with equal acuteness of vision in both eyes, and normal fixation, 1° exophoria with Maddox rod, only 7 were found who had less sharp binocular vision than expected by the theory. It is therefore a rule with rare exceptions. Parallax thru head motion was excluded. Small motions of the head seem to have only a very slight effect.

Brooksbank James had a second theory, that the stereoscopic vision diminishes with the visual acuity. To determine this the most appropriate subjects for testing are men whose visual acuity is equally diminished in both eyes. Because for them the difference in distance can be computed which should be recognized if this supposition be correct. Such cases, however, are not so numerous. Schoute could examine 102 cases. They were tabu-

lated, arranged in the vertical direction according to the visual acuity, and in the horizontal direction according to the length of the base line. He found the average differences of distance which was still recognized with a certain visual acuity, and that which ought to be so recognized according to Dr. James. Because of the small number of observations the influence of the length of the base line is buried among the individual differences.

But on consideration of the averages of table I, it was seen that the stereoscopic vision in most cases is much finer than would be expected from computation. In spite of this the stereoscopic vision goes to a certain degree parallel with the visual acuity. When this becomes poorer the power to judge of differences of distance decreases, and this decrease begins with the first diminution. With $V. = 5/10$ the first person appears who cannot recognize a difference in distance of 30 centimeters at a distance of 5 meters from the instrument. Such findings become more frequent, with $V. = 1/10$; only few can recognize a distance of less than 30 centimeters. With smaller visual acuity none can recognize 30 cm. difference.

To find out the stereoscopic vision of these latter persons they were examined at 4 meters and even at 3 or 2 meters. These observations are found in a third table. But among the persons thus examined were wide differences of stereoscopic vision. A person with $V. = 5/10$ did not even recognize, at 2 M. from the instrument, a distance between the threads of 30 centimeters. But persons with $V. = 4/10$ and $3/10$ make good observations at 4 meters. With $V. = 2/10$, and $1/10$ these determinations become much worse. Many could only make such determination at 3 meters, and and not a few at only 2 meters; while with one with $V. = 1/10$ this was not possible even at 2 meters. With smaller visual acuity the determinations at 4 M. became impossible, until a case with $V. = 1/50$ surprised with a good determination.

E. E. B.

PROTECTIVE GLASSES.

The choice of glasses to protect the eye from harmful radiations has until recently been empirical. Blue, green, smoke, amethyst, and amber glass have in succession been urged by some one, as best suited to protect the eye from excessive exposure. According to the reputation or plausibility of their advocates has one kind of glass or another found general favor with the profession, or the public. But something of a scientific basis for the choice of a particular kind of glass for a particular kind of service now becomes possible.

The report made to the Section on Ophthalmology at the New Orleans meeting (see p. 688) places at the command of the oculist the data needed for a scientific selection of the kind of glass that will give the protection required from a certain kind of exposure. The observations recorded in this report have been made by trained expert observers in a sufficiently equipped physical laboratory. So far as they go they can be relied on as accurate. Of course, they deal only with samples of protective glass that have been recently obtainable, and cannot be expected to exhaust the possibilities of such protection that may be developed in the near future.

For the samples actually examined the observations were probably accurate to within a minute fraction of one per cent. But the variations that occur in different samples of glass, sold under the same name, must be allowed for, even tho they be carefully made by the same formula; so that the figures given in the table can only be regarded as an approximation to what the patient will get on prescription. An exact prescription would also have to include the thickness of the glass to be furnished. But a fair approximation to the average thickness of spectacle glasses was had in the samples tested; and the thickness of these being given, allowance can be made for lenses of unusual thickness. With all its limitations the report furnishes data that make possible a more accurate and effective use of resources at

our command for protection of the eyes.

Aside from protection from wind, dust and flying solid masses, glasses may be used to exclude three sets of radiations that might prove harmful to the eyes; infrared or heat radiations, the visible spectrum, when the light is too intense, and the ultraviolet or actinic radiations. For these three different purposes different kinds of glass must be chosen. Much of the older literature on the subject of protective glasses is of little value, because of failure to discriminate between these three kinds of injurious influences to be guarded against. Guarding against excessive heat is a different matter from guarding against an excess of ultraviolet radiation, and both differ from exclusion of excess of light.

The exclusion of ultrared radiations from the deeper parts of the eye is well provided for. Water is extremely opaque to heat rays, and cornea, aqueous, and vitreous share this protective function. But the glass found most efficient in this direction is ordinary crown glass covered with a very thin layer of gold. Such glass excludes 99 per cent of the heat rays, yet it still transmits about 23 per cent of the visible rays in the green part of the spectrum. Crookes' sage-green Ferrous glass (entirely different from the Crookes' A and B so widely advertised), cuts off almost as much of the infrared, but transmits 44 per cent of the visible green light; and the light bluish-green glass (Corning G. 124 J. A.), excludes heat almost as well, and transmits 52 per cent green light. It is possible with these glasses to afford protection practically complete from all harmful heat.

Ultraviolet radiations penetrate the ocular media much more deeply. For their exclusion we must depend more upon glasses of special chemical composition placed before the eyes. Of these some, like the "Crookes' A" glass are very nearly colorless, and transmit freely most of the visible spectrum, but greatly reduce the ultraviolet radiations. Other glasses having slightly more color, generally greenish, like

"noviol C," transmit a little more light and exclude a little more of the ultraviolet rays. With glasses of this class the ultraviolet of ordinary artificial illuminants, or sunlight even at high altitudes can be rendered harmless.

When, however, it is necessary to face a source of ultraviolet and visible rays of high intensity, with a proportion of heat rays as in electric or oxy-acetylene welding a different problem is encountered. To meet this situation glasses that interrupt a large part of both the visible and the ultraviolet rays, and to some extent the infrared are needed. The supply of such glass is apparently not yet so well worked out and standardized as is the case for the other kinds of protection. But various "black," dark purple-red, and yellow glasses combine these qualities in high degrees. They are not likely to be prescribed by the oculist, but are known chiefly to those who may need to use them in work requiring exposure to intense light sources.

Much remains to be done in the direction of testing different kinds of glass that may be put forward, as to their transparency to various radiations. Much also remains to be done to set forth in clear readily understandable terms the results already arrived at. Such needed advances will be stimulated if ophthalmologists generally study the subject carefully, and begin to formulate their demands more definitely than they have done heretofore. To procure and carefully study the publications of the Bureau of Standards setting forth the results of such tests "Technologic papers No. 93 and No. 119" is a good start to make in that direction.

E. J.

THE MOORFIELDS APPEAL

Below will be found a statement which must surely touch a responsive chord in the hearts of the majority of our readers. American ophthalmologists are few, who in their travels and studies abroad, have not visited or labored within the hospitable walls of "Moorfields," either of the old building

near the Liverpool Station or on the City Road.

Ever since 1804, when it was founded by Saunders mainly for the relief of that terrible trachoma brought by returning troops from the Egyptian campaign, until the present day, Moorfields has freely furnished the English speaking profession thruout the world with unsurpassed facilities and opportunities for the study of our specialty in all its branches. The long list of attending surgeons of the Royal London Ophthalmic Hospital not only includes many of the most distinguished teachers of British ophthalmology, but its roster of clinical assistants and house surgeons bears the names of many a brilliant ophthalmologist from this side of the Atlantic.

Let us, then, show our appreciation of the good work done by this admirable institution by contributing generous checks, either direct to the Committee, or thru the Editor of this Journal, who will be glad to receive and forward them to the proper official.

C. A. W.

CORRESPONDENCE

THE ROYAL LONDON OPHTHALMIC HOSPITAL

This Hospital, established 116 years ago, and best known thruout the civilized world by its popular name "The Moorefields Eye Hospital," is the parent of all similar institutions thruout the English speaking world.

In 1811 Dr. Edward Delafield and Dr. J. Kearney Rodgers, then young men who had recently graduated in medicine at the College of Physicians and Surgeons in New York, came to London and studied at this Hospital under Dr. Farre and Mr. Benjamin Travers. On their return to their own country in 1818, so impressed had they been with all they had seen and learnt at the London Eye Infirmary, as it was then called, that they determined to establish a similar institution in America.

This they succeeded in doing and in

August, 1820, "The New York Eye and Ear Infirmary" commenced the great and beneficent work which it continues to carry on at the present time.

In 1816 Dr. Edward Reynolds came from Boston, Mass., to London to pursue his medical studies. He attended the practice and lectures at this Hospital under Mr. Benjamin Travers and Sir William Lawrence. On his return home he found his father blind from cataract in both eyes. With rare courage, fortified by his recent experience in London, he decided to operate. Happily the operation proved a complete success. It had never been undertaken in Boston before. It led to the foundation of Dr. Reynold's reputation as the leading surgeon in diseases of the eye, and to the foundation in 1824 of "The Massachusetts Charitable Eye and Ear Infirmary," which still exists as a center of light and leading.

Ever since these fathers of ophthalmology in the United States came to study at this Hospital there has been a continuous succession of American medical men working in its wards, its operation theater, its out-patient department, and its laboratories.

Nurses like medical men, who are engaged in the treatment of diseases of the eye require special training beyond that which is provided for them in their ordinary curriculum. Moorfields Hospital aims not only at supplying all that is required for training ophthalmologists but also in supplying suitable training for ophthalmic nurses. Many nurses who have received such training at this Hospital have gone from it to take up similar work in various parts of the British Empire and America.

Immense progress has been made in ophthalmology since the Hospital was first established, and much of this has been effected by the researches of the many distinguished surgeons who have served on its staff.

Many further advances are ripe for investigation in several different directions, but can only be carried out if the necessary means are forthcoming. Work such as this benefits not only one class, one community, or one national-ity, but the whole human race.

Moorefields Hospital feels that, in view of what it has already accomplished and what it is striving to do in the future, it is justified in appealing for the necessary funds not only to the British but also to the American public.

It asks then for a contribution toward a fund of £100,000 for the following purposes:

(a). To enable it to extend its laboratory accommodation for purposes of clinical and pathologic research.

(b). To supply adequately paid assistance to the Honorary Medical Staff, which will liberate them from much of the routine work which they now have to perform, and allow of them devoting more of their time to clinical instruction and research for which they are so eminently qualified.

(c). To supply adequate accommodation for the nursing staff, not only those who carry on the general work of the Hospital, but also those desirous of obtaining a special training in the nursing of cases of diseases of the eye.

PRINCE ARTHUR OF CONNAUGHT,
President of the Hospital.

BOOK NOTICES.

Harald G. A. Gjessing. *Kliniske Linsestudier.* Paper, 8 vo., pp. 356, with tables and 12 charts. Drammen, Norway. 1920.

This book, published as a supplement to the *Norsk Magazin for Laegevidenskaben*, may be of little direct value to those of us who cannot read the Norwegian-Danish language. But in some measure it illustrates an investigation that can be carried on in any part of the world; and must be joined in by many workers before its object can be attained. Gjessing begins and ends by quoting from *Le Grand Nichol* (1574) "Non ergo credo omnium suffusionum est eadem causa," hinting the wide etiology of cataract. And with this he joins the recent statement of Roemer (1913), that "today is the true cause of the development of senile cataract unknown." To the solution of the unsolved problem he

had applied a large amount of observation, especially with the aid of the Gullstrand lamp and the corneal microscope.

After describing methods of examination, including use of red-free light, the normal lens after 15 years of age is discussed, and then the lens after birth until 15 years. Then the pathologic anatomy of the lens, and the more important theories of cataract are given, toxic, chorioretinal, action of light, heredity, the internal secretions, tetany, and finally the Hess-Roemer theory of cataract. After this in tabular form are arranged what are supposed to be the important collateral facts bearing on the condition of 4,768 eyes of 2,411 persons.

The cases are arranged in five year groups beginning with 6 to 10 years; of blue eyed males, blue eyed females, brown eyed males and brown eyed females. The facts noted are arranged in 9 columns giving: (1) Age and name. (2) Race relations or family history. (3) General conditions supposed to have influence. (4) Special observations on other parts of the eye. (5) Vision and refraction. (6) Condition of the lens nucleus. (7) Description of variety of cataract. (8) Localization of the opacity. (9) Remarks.

This tabulation of observations occupies 180 pages. It is followed by a consideration of the various agencies related to the condition in the different periods; and special analysis as to certain things like the refraction, the localization of the opacities, family history, etc. The volume concludes with an appendix on tonometry, a resume, and list of available literature including 405 titles to papers supposed to bear on the subject, of which 18 appeared in Great Britain and 4 in America. Evidently only the Scandinavian and German literature are familiar to the author.

E. J.

Fifth Annual Report, 1917, Ophthalmic Section, Department of Public Health. Egypt. Quarto. pp. 24. 3 charts and 20 tables. Cairo, Government Press, 1919.

This pamphlet, prepared by the Di-

rector of Ophthalmic Hospitals in Egypt, Dr. A. F. MacCallan, reports the work done at 13 permanent and 4 traveling hospitals during the year 1917. There were 81,529 new patients treated, and for these 59,581 operations were done. The attendances of outpatients numbered 1,004,161.

Altho these pages are about twice the size of those of an ordinary medical book, we know of no work of the kind in which such valuable information is so closely packed. The large page offers a favorable means for presenting tables and charts, which give statistical facts in most condensed form. Each of these tables is valuable. For instance, the first, which is one of the smaller ones, gives the patients coming on account of acute conjunctivitis, a total of 12,642 arranged according to diagnosis under 10 heads.

Another of the smaller tables (table XI) deals with the incidence of primary glaucoma. Of these there were 9,686 cases for whom were done 2,924 operations. For trichiasis and entropion, the operations done numbered 30,200, not including epilations and electrolysis for destruction of lashes.

The report ends with an appendix giving the annual publications of the "Ophthalmic Section," and telling if they are available.

We shall have occasion to use from time to time some of the material here assembled. The report as a whole challenges attention to the possibilities of Egypt as a training ground for certain kinds of operations. It is interesting to note among the activities of the Ophthalmic Section, the giving of a complete course of postgraduate lectures on ophthalmology, including pathologic and bacteriologic demonstrations and laboratory work.

E. J.

Tractus de Conservazione Sanitatis Oculorum. Johannis de Lasso. Octavo, 10 pages. Figueras, Spain. F. Cusi.

This treatise on the hygiene of the eye was written by Doctor de Lasso of Florence in July, 1346. From copies of the Latin manuscript, found in the

National Libraries of Paris and Metz, Dr. P. Pansier, of Avignon, published in 1903. This present publication is of a French translation by Prof. Jean Lamouroux. It is neatly printed in antique lettering with illuminated title page and heading. It is one of those literary bridges, which carry the student into the thinking and atmosphere of the middle ages.

After an exordium which magnifies the importance of vision, chapter I takes up Things Which Injure the Eye and Weaken It. Chapter II is Of the Things Beneficial and Strengthening to the Sight. Chapter III deals with the Question of Remedies Suited to Preserve the Sight and to Restore That Which Has Been Lost. Chapter IV treats of Medicines and Electuaries to Preserve and Restore the Sight. Chapter V is devoted to Diet.

We do not find here any mention of spectacles or cataract operations, mydriatics, myotics, or the cautery. The thought that arises from a glance thru these pages is one of appreciation of the enormous advance that ophthalmic science and art have made in the last six hundred years.

The work of Pansier we could ill afford to lose from among our histories of ophthalmology. And it is a piece of commendable, as well as shrewd advertising for the Cusi Laboratories of the North of Spain, to give a wider circulation to this little brochure. The rescue and preservation of a classic is a worthy claim to attention and remembrance. In this case the tract used is not submerged in the advertising it carries. E. J.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities.

DEATHS.

Dr. Luther Z. Breaks, Terre Haute, Ind., aged forty-one, died of angina pectoris, July 10.

Dr. John F. Campbell, Chicago, aged fifty-six, died July 14 from angina pectoris.

Dr. Hiram B. Morse, Bay City, Mich., aged forty-nine, died July 13 from cerebral hemorrhage.

Dr. Ernest A. Robin, New Orleans, La., aged fifty-one; Professor of Diseases of the Eye in the New Orleans Polyclinic; First Assistant Surgeon in the Eye Department of the Eye, Ear, Nose and Throat Hospital, New Orleans; died, July 9 from heart disease.

Dr. John Steinbach, Winona, Minn., aged sixty-four, died April 28.

PERSONALS.

Col. F. P. Maynard, formerly of Calcutta, India, has returned to England, and will continue a consulting practice in Crewe, England.

Dr. Henry S. Miles, of Bridgeport, Conn., announces the removal of his offices to the Professional Building, 881 Lafayette street.

The partnership practice which has been carried on by Dr. Nelson M. Black and Dr. Vernon A. Chapman at Milwaukee terminated, May 12, 1920, one year from the former's return from service—in accordance with the original agreement. Each will individually continue the practice of ophthalmology and otolaryngology in the Wells Building, 120 Wisconsin street, Milwaukee.

Dr. James A. Spalding, of Portland, Me., celebrated, on June 28, 1920, his medical golden wedding, his medical degree having been received at Harvard University in 1870. The Doctor has been a life-long sufferer from deafness, so that his great success as a specialist on the eye, ear, nose and throat seems remarkable. Not long ago he operated on a patient ninety-two years of age for cataract, with a perfect result, the average age of patient and operator being eighty-one years plus. He also had the pleasure, perhaps unique, of

operating, very long ago, for cataract on a woman aged ninety, with excellent vision, and, in recent years, on her son, aged eighty-six, again with a perfect result. The Doctor has written and translated numerous scientific papers and books, and is now president of the Maine Medical Society and editor of the Maine Medical Journal.

SOCIETIES.

The Colorado Congress of Ophthalmology and Oto-Laryngology met in Denver July 23 and 24. The program was of unusual excellence and the attendance large. Thirteen different states were represented. The mountain parks ride and dinner on the evening following the meeting was enjoyed by all. The ophthalmologic papers presented will be published in the American Journal of Ophthalmology.

The meeting of the American Academy of Ophthalmology and Oto-Laryngology will be held at the Muehlbach Hotel, Kansas City, Mo., October 14-15-16. This will be the twenty-fifth annual meeting of the Society and will be made something of an anniversary of the occasion. The local committee of arrangements, of which Dr. Hal Foster is chairman, is planning to make the occasion a very pleasant one. The program is about completed. Members desiring to illustrate their papers or discussions by lantern slides stereoscopic, microscopic, etc., should communicate with Dr. Joseph Lichtenberg, Rialto Building, Kansas City, Mo.

The Pacific Coast Oto-Ophthalmological Society met in Portland, Ore., on July 22-24. Some important ophthalmologic papers were presented which we hope to publish in subsequent issues of this journal. One who has attended similar meetings in different parts of this country describes this as "one of the most satisfactory meetings that I have ever attended."

MISCELLANEOUS.

Examinations for the certificate of the American Board of Ophthalmic Examinations will be held at Kansas City, Mo., October 13, the day preceding the meeting of the American Academy of Ophthalmology and Oto-Laryngology, at the Medical Department of the University of Kansas, Rosedale, Kan., which may be reached by trolley line from the center of Kansas City every few minutes.

A diploma in ophthalmic medicine and surgery will hereafter be given by the Conjoint Board of the Royal College of Surgeons

of England and the Royal College of Physicians of London. The examinations of this conjoint board in medicine, surgery and obstetrics have been recognized thruout the world as a test of fitness for high positions in the medical profession. The new examination will be divided into two parts. Part one includes the anatomy and embryology of the visual apparatus, the physiology of vision and elementary optics. It may be taken by any one who has qualified in medicine, surgery and midwifery. Part two consists in the examination upon optical defects of the eye, ophthalmic medicine and surgery and pathology. It may be taken on the completion of one year of special study of ophthalmology.

The Nela Research Laboratory was organized in 1908 under the directorship of Dr. Edward P. Hyde as The Physical Laboratory of the National Electric Lamp Association. The name was changed to Nela Research Laboratory in 1913, when the National Electric Lamp Association became the National Lamp Works of General Electric Company. For some years the Laboratory was devoted exclusively to the development of those sciences on which the art of lighting has its foundation, but in 1914 the functions of the Laboratory were extended by the addition of a small Section of Applied Science, which had an immediate practical objective.

Section of Applied Science is now being largely extended as a separate Laboratory of Applied Science under the immediate direction of Mr. M. Luckiesh, who becomes Director of applied Science, and a new building is being constructed to house this branch of the work, which will be carried forward with a staff of several physicists, an engineer, an architect and a designer, together with the necessary technical and clerical assistants.

Dr. Ernest Fox Nichols, formerly President of Dartmouth College, and more recently professor of Physics at Yale University, has accepted an invitation to assume the immediate direction of the Laboratory of Pure Science, under the title of Director of Pure Science. The work of this Laboratory, which will be continued in the present building, will be somewhat further extended under the new organization.

The Laboratory of Pure Science and the Laboratory of Applied Science will together constitute the Nela Research Laboratories, and will be coordinated under the general direction of Dr. Hyde, who becomes Director of Research.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colo.

DIAGNOSIS.

- Duane, A.** Complementary Color Test for Perimetry. *Arch. of Ophth.* v. 49, p. 449.
- Engelking, E., and Eckstein, A.** Physiologic Choice of Model Colors for Clinical Perimetry. *Klin. M. f. Augenh.* v. 64, 1920, p. 88-106.
- Howard, H. J.** Uniform System of Eye Tests. *China Med. Jour.*, 1920, v. 34, p. 226. *Abst. Amer. Jour. Ophth.* v. 3, p. 702.
- Peter, L. C.** Essentials of Perimetry. (Dis.) *Amer. Jour. Ophth.* v. 3, p. 524-526, 584-587.
- Repeated Titles.** **Gallemaerts and Kleefeld** (v. 3, p. 237) *Amer. Jour. Ophth.* v. 3, p. 542.

THERAPEUTICS

- Goldberg, H. G.** Cocain Poisoning. (Dis.) *Amer. Jour. Ophth.* v. 3, p. 527.
- Paraf, J.** Antogonococcic Serotherapy. *Clin. Ophth.* v. 24, p. 279-288.

Operations.

- Coover, D. H.** Postoperative Streptococcic Infection Cured by Diphtheria Antitoxin. *Amer. Jour. Ophth.* v. 3, p. 536.
- Bonnefon.** Flexible Eye Bandage. (5 ill.) *Ann. d'Ocul.* v. 157, 1920, p. 373-377.
- Schrittleiter.** Graefe's Cataract Knife. *Woch. f. Therap. u. Hyg. d. Auges.* v. 22, p. 129.
- Vogt, A.** Operations on Globe with Subconjunctival Anesthesia. *Clin. Ophth.* v. 24, p. 317.
- Repeated Titles.** **Guglianetti** (v. 3, p. 314.) *Amer. Jour. Ophth.* v. 3, p. 545.

REFRACTION

- Duane, A.** Theoretic and Practical Points in Refraction Work. *Arch. of Ophth.* v. 49, p. 349-366.
- Fuchs, E.** Anatomy of Congenital Myopia. *Klin. M. f. Augenh.* May, 1919.
- Greeff, R.** Technical Improvement in Optical Lenses. *Klin. M. f. Augenh.* v. 64, 1920, p. 120.
- Heidrich, A.** Origin of State School of Optics in Jena. *Woch. f. Therap. u. Hyg. d. Auges.* v. 22, p. 194-196.
- Hyde, E. P., and Cobb, P. W.** Monocular and Binocular Field Glasses. *Jour. Franklin Inst.*, 1920, v. 189, p. 331-370.
- Jackson, E.** Base Line for Ocular Measurements. *Amer. Jour. Ophth.* v. 3, p. 548.
- Jess, A.** Tonic Accomodation. *Klin. M. f. Augenh.* v. 64, 1920, p. 114-117.
- Olsho, S. L.** Coordination of Refraction with Spectacle and Eyeglass Fitting. (18 ill.) *Amer. Jour. Ophth.* v. 3, p. 1920, p. 481-492.

- Paton, L.** Cobalt Glass in Detecting Astigmatism. *Royal Soc. of Med., Sec. on Ophth.* March 3, 1920. *Amer. Jour. Ophth.* v. 3, p. 516.
- Remak.** Acute Transitory Myopia. *Clin. Ophth.* v. 24, p. 312.
- Terson, A.** Refraction and Central Scotomas. *Ann. d'Ocul.* v. 157, p. 365-368.
- Tscherning, M.** A Scale of Brightness; The Optical System and Gauss' Theory. *Abst. Brit. Jour. Ophth.* v. 4, 1920, p. 341.
- Vandegrift, G. W.** Optics of Cornea. *Arch. of Ophth.* v. 49, p. 421-429; and 450.

OCULAR MOVEMENTS.

- Caneja, E. D.** Physiology of Binocular Diplopia. (7 ill.) *Arch. de Oft. Hisp.-Amer.* v. 20, 1920, p. 215-229.
- Cadwalader, W. B.** Paralysis of Associated Upward and Downward Movements of Eyeballs. *Arch. of Neurol. and Psychiat.* v. 4, p. 237.
- Doesschate, G. ten.** Excentric Fixation in Strabismus. *Nederl. Tijdschr. v. Geneesk.* 1920, i, p. 1250.
- Garrahan, J. P.** Oculomotor Paralysis in Infant. *Arch. Latino-Amer. de Ped.* v. 14, 1920, p. 114. *Abst. Jour. A. M. A.*, v. 75, p. 278.
- Gertz, H.** Central Mechanism for Movements of Eyes. *Acta Med. Scand.* v. 53, p. 445.
- Gonzalez.** Instruments for Strabismus Operation. *España Oft.* v. 5, p. 170.
- Grünbaum, A.** Representation of Direction of Movements of Eyes. *Arch. Neerl. de Psychiat.* La Haye, 1919-1920, v. 4, p. 216.
- Hardy, W. F.** Heterophoria. (Dis.) *Amer. Journal Ophth.* v. 3, p. 517.
- Hazen, E. H.** Ocular Orientation. *Arch. of Ophth.* v. 49, p. 434-443.
- Howard, H. J.** Tenotomy of Inferior Oblique. (4 ill.) *Arch. of Ophth.* v. 49, p. 381-389.
- Heimann, E. A.** Operative Treatment of Weakness of Convergence Hyperphoria. *Berl. klin. Woch.* v. 57, 1920, p. 157.
- Hughes, H. S.** Muscular Anomalies. *Amer. Jour. Ophth.* v. 3, p. 521.
- Jeandelize, P. and Lagarde.** Nystagmus of Emotional Origin. *Soc. Fr. d'Ophth.* May 1920. *Ann. d'Ocul.*, v. 157, p. 385.
- Nuclear Ophthalmoplegia.** *Clin. Ophth.*, v. 24, p. 298.
- Paton, L.** Vestibular Nystagmus. *Roy. Soc. Med. Sec. on Ophth.* March 3, 1920. *Amer. Jour. Ophth.* v. 3, p. 515.
- Suffa, G. A.** Clinical Demonstration of Muscle and Fusion Testing. *Jour. Ophth.*

Otol. and Laryngology, August, 1920, p. 258-261.

CONJUNCTIVA

Engelking, E. Scrofulous Lichen of Conjunctiva. *Klin. M. f. Augenh.* v. 64, 1920, p. 56-70.

Friede, R. Tuberculids of Bulbar Conjunctiva. *Klin. M. f. Augenh.* v. 64, 1920, p. 45-56.

Pederre, M. J. J. A. Subconjunctival Injections of Sterilized Milk in Phlyctenular Kerato-conjunctivitis. 26 p. 8 v. Bordeaux, 1919.

Peyrelongue de. Treatment of Trachoma after Abadie. *Clin. Ophth.* v. 24, p. 271.

Posey, W. C. Ocular Pemphigus. *Amer. Jour. Ophth.* v. 3, p. 507-510, and 524.

Schnaudigel, O. Conjunctiva Neuroallergica. *Klin. M. f. Augenh.* v. 64, 1920, p. 70-79.

Shumway, E. A. Vernal Conjunctivitis. (Dis.) *Amer. Jour. Ophth.* v. 3, p. 523.

CORNEA AND SCLERA

Kruse, F. W. Necrotic Phlyctenulosis. *Klin. M. f. Augenh.* v. 64, 1920, p. 80-88.

Maghy, C. Anatomic Study of Six Cases of Degeneration of the Cornea. (Dis.) *Amer. Jour. Ophth.* v. 3, p. 533.

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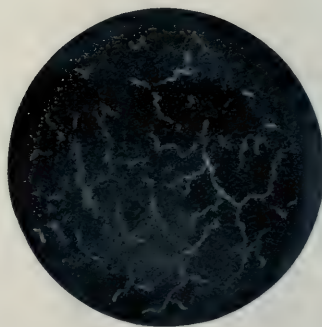
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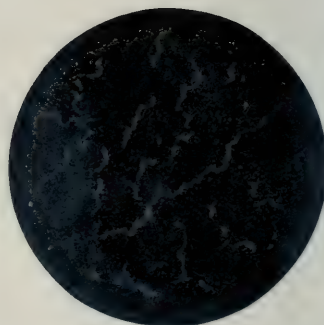
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RIGHT EYE



LEFT EYE



RETICULAR KERATITIS. (BYERS). OPACITIES SHOWN BY OPHTHALMOSCOPIC
AND OBLIQUE ILLUMINATION. (SKETCHES BY DR. GROSS).

RETICULAR KERATITIS

W. GORDON M. BYERS, M.D.

MONTREAL, CANADA.

This is the detailed report of a case, presenting novel clinical findings; with special reference to the bearing of these findings upon the etiology of reticular keratitis.

Among the rare diseases of the cornea, lattice-like or reticular keratitis occupies a foremost place in point of interest. The morphologic features of this entity are now fairly well defined, and a little work has been done on its morbid histology; but a full explanation of the curious disorder awaits the chance of an examination of an eye affected in this way, as well as the solution of some of the most difficult problems in ocular pathology.

Some novel clinical findings in the following case seem, in the meantime, however, to throw some light upon the origin of the corneal changes, and to point to the general factors which may predispose to the local condition. Especially is this true if one studies the case in connection with observations on closely related keratitides.

The patient was a physician, aged 47, who began to feel about a year previously that he needed stronger glasses for reading, and that he was shooting badly. He stated also that he saw three images with either eye. A white line against a black background, for instance, appeared in triplicate, the lateral lines being about equidistant from, but not nearly so clearly defined as, the middle one. As a consequence people looked broader and stouter owing to overlapping of the images. There was no history of injury, and no other complaints (including hemeralopia and nyctalopia).

The man had had measles and scarlet fever in childhood, and typhoid at fourteen. After that no illness until 1912, when for 11 months he had attacks of renal colic occasioned by the slow passage of a stone. A cancer of the right breast, which seemed to follow a fall on

the side, rupturing a rib, was removed in April, 1917.

In the family history it was to be noted that there had been no hereditary eye trouble in the three generations of which the patient had knowledge. There did seem to be, however, a tendency to malignancy and to arterial degeneration. Two of his maternal aunts, as well as a maternal cousin (female), had died of cancer; while both his father's father and mother, and one paternal aunt, had succumbed to apoplexy. His father died at 62 of diabetes, after being afflicted with this condition for 10 years; his mother of cardio-renal disease at 44.

Taking in particularly the central area of the cornea, and without the slightest sign of any irritation or congestion, one saw the changes which have been described under the term "reticular" or "lattice-like" keratitis, and are more fully dealt with later in this report. I had never seen a case of this kind, but I immediately recognized it from Hudson's illustration (1), which had stamped itself on my memory.

The accompanying plate from a sketch by Dr. Gross gives an approximate idea of the distribution of the opacities as seen by transillumination, and by oblique illumination.

With the corneal microscope, in the short period I was able to have the patient under observation, I satisfied myself that the lines were in or immediately beneath Bowman's membrane. I could not determine with certainty what position the opacities occupied in relation to the surface of the cornea. They seemed at times to be depressed below, at others raised above, the epithelial coverings. I think both conditions existed. In any

case the unevenness of the surface was everywhere shown by a slight, but definite, distortion of the mires of the ophthalmometer.

The threads of the reticulum seemed to spring directly from one another; but rarely one could see lines, more deeply situated, crossing beneath those more superficially placed. Not infrequently one came across streaks, the continuity of which was occupied for a short distance by a chain of minute, sand-like beads of crystalline substance. These were particularly well seen when the pupil was dilated.

The pupils, while equal and regular, were unusually active to light. There were no changes in the fundi. The fields of vision were full; and central vision was as follows:

R., With—cyl. 1.0 D. axis 90, 6/12.

L., With—cyl. 1.0 D. axis 75, 6/12.

With + sphere 1.5 D. added, Sn.1. with each eye at 12". At the first consultation tension was as follows: R., 15 mm. Hg.; L., 13 mm. Hg. A year later (after twelve months of great activity), the doctor again unselfishly submitted to a further reading of tension, which was found to equal on both sides about 13.5 mm. Hg.

The systemic examination carried out for me by Dr. Cushing yielded the following facts: General condition good; patient considerably over weight (197 lbs.; no change in three years). Lungs normal. Heart normal, except for occasional ventricular extra systoles; no evident arteriosclerosis; blood pressure 135—90; abdomen negative; digestive system normal. The faintest trace of sugar in the urine; otherwise examination of the kidneys negative. Nothing found anywhere to suggest past or present tuberculosis. Wassermann, etc., negative.

Summarizing, Dr. Cushing wrote as follows: "Altho nothing definite was found, still the excess of abdominal fat, missed beats in the heart, recent carcinoma, and renal calculus give the impression of a man past his prime and showing signs of degeneration."

REMARKS.

Since Dimmer's paper (2), the linear opacities in reticular keratitis have been

attributed to rucking of Bowman's membrane. Close inspection of the cornea with binocular magnification would probably convince anyone of the correctness of this view. The changes are certainly not more superficial, because they persist after exfoliation of the epithelium. On the other hand, the unevenness of the corneal surface, the refractive nature of the lines, and particularly their transparency in the direction of their course, all speak in favor of foldings of Bowman's membrane.

Now folding of Bowman's membrane is a well recognized and, in my experience, not uncommon microscopic finding in soft, atrophic eyeballs. The condition is clearly shown in association with corrugation of Descemet's membrane (Fig. 1.), in the accompanying microphotograph of the cornea of an eyeball greatly shrunken under plastic uveitis. I did not see this globe before its removal, and there are singularly few observations in the literature regarding the clinical appearances produced by the bucklings in Bowman's membrane. Parsons (3), without describing them, mentions having seen striate opacities from this cause, and quotes the case of Schirmer (4),—that of "a shrunken globe, in which the cornea was much diminished in size, hazy, and traversed by fan-like stripes, diverging above, where they did not reach the corneal margin, and ending below in a horizontal, slightly bent, gray line. In horizontal sections, there were six waves in the epithelial surface, below which were sharp triangular depressions in Bowman's membrane, which was intact."

More important are the observations of Spicer (5). This writer described in 1916, under the name of superficial linear keratitis, a series of cases in which, with pain and congestion, a number of superficial ridges of epithelium suddenly made their appearance in the cornea. These ridges were raised from the general level of the corneal surface; were, for the most part, vertical in arrangement; and gray in color, with tapering ends, not reaching to the limbus. Under magnification, the ridges were seen to be double contoured with a comparatively clear center

Almost always, during at least some portion of the attack, there was a softening of the eye, tension falling to -1 , and often to -2 . The attack itself lasted for a few days to a week or longer; and, as the ridges disappeared, the vision recov-

diminished tension has not heretofore been made out in these cases cannot be used as an argument against the supposition; for we may well have had in them, as in chronic glaucoma, variations so slight as to call for the more sensitive

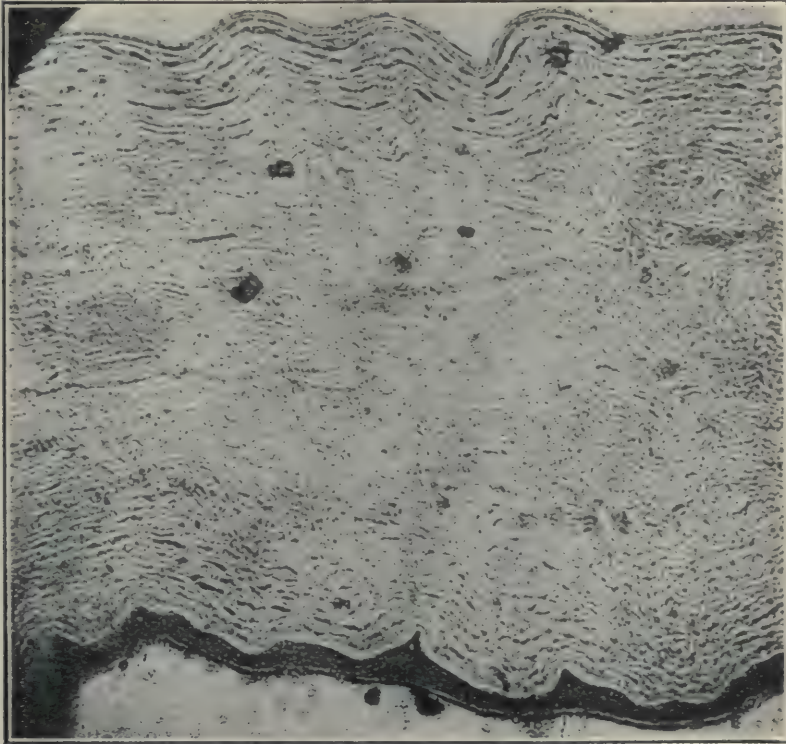


Fig. 1—Section of cornea showing corrugations of Bowman's membrane in association with marked rucking of Descemet's membrane.

ered and the tension became normal again.

Microscopic examination of two eyes by Affleck showed that the linear opacities were due to ridges in Bowman's membrane. The ridges varied in appearance in different places; but they were always characterized by the presence of new fibrous tissue in the immediately underlying *substantia propria*.

In the light of this evidence, and the finding of the hypotonia in my case, one is justified in advancing the hypothesis that reticular keratitis has its origin in lowered intraocular tension; and the same would hold for nodular and fleck-shaped keratitis if the view of Fehr (6) be correct, that the three conditions are but phases of a single entity. The fact that

tonometer for detection. The complicated arrangement of the corneal opacities in reticular keratitis bespeaks a low-grade hypotonia of long standing; in contrast with the coarser changes in Spicer's cases, which were characterized by sudden reductions of comparatively short duration. We may have, in a word, in this group of cases, underlying hypotonias which correspond to acute and chronic glaucoma.

Incidentally it will be interesting to observe if eyeballs with greatly diminished tension following sclero-corneal trephining will develop changes similar to those in reticular keratitis. In the few cases thus affected among my own patients I have been unable, however, to detect anything of a like nature.

The myopic astigmatism contrary to the rule is another point in the present case which favors the hypothesis of hypotonia; for, granting diminished tension, the increased corneal curvature would naturally be greater between the stronger pair of opposing muscles. Biber's case (7) showed the same error of refraction, which might be more carefully looked for in the future. In the left eye of my patient, the lines could be plainly seen to correspond rather closely to the oblique axis of the cylinder (See Plate IX).

The crystalline beads can be interpreted in other ways, e. g., as the terminal phase of a hyalin degeneration, or as detritus following the nutritional death of cellular elements; but, more probably, they are residual from a preexistent transudation of corneal lymph, which may well have been into clefts created by a separation of Bowman's membrane from the *substantia propria*. Whatever view we adopt, we might surmise further that these bodies (or even a lymph with a more concentrated saline content) are responsible, thru irritation, for the connective tissue deposits observed by Affleck; and that the connective tissue in turn is the cause of the wide spread gray-ing of the cornea that marks the later stages of reticular keratitis and the related keratitides. Taking as a whole the few observations that have been made in connection with this group of cases, we have in the crystalline, hyalin, and connective tissue deposits exactly those changes one would expect to find as the result of a stasis associated with hypotonia.

Studying the cases of reticular keratitis that have heretofore been reported, one feels that the systemic examinations have been inadequate. Where possible every patient affected in this way should be exhaustively studied, preferably in a metabolic ward, with a view to detecting disturbances that might possibly underlie the hypotonia. In the hereditary groups, hereditary defects might be discovered.

Following the lead suggested by the slight glycosuria in my case, and having in mind the observations of Riesman (8)

and others regarding the association of hypotonia with diabetic coma, I investigated, with the assistance of Dr. E. A. McCusker, the ocular tension in a number of cases of diabetes in the metabolic ward. In these we found that the average reading was slightly below the normal lower limit. Another series of readings in ambulatory diabetics (former in-patients in attendance as out-patients) gave, however, only normal findings. This suggested to me that rest and confinement were responsible for the low readings in the first group; and this observation was confirmed by similar low figures in a number of surgical patients who were incapacitated solely by fracture and the like. The number of cases studied in this way is too few to permit one to dogmatize; but the assumption that the intra-ocular tension, in keeping with the general blood pressure, is lowered by rest is obvious in any case. One has here an indication both for glaucoma and hypotonia (reticular keratitis). In the present case it is apparent that retardation of the process could only follow a betterment of the physical condition thru massage, out-of-door exercise, diet, and the like.

That neither reticular keratitis nor any of the related conditions is a true inflammation is, apart from the findings enumerated, evidenced by the fact that at no time in their course is there new-vessel formation; and that congestion is present only in response to denudation of the epithelium, or in the later stages, perhaps as the result of the irritation of which I have spoken. The word keratitis should, therefore, be abandoned. In its place one could employ the term anterior (or superficial) corneal corrugations (or corrugations of Bowman's membrane), from acute or chronic hypotonia; in contradistinction to the posterior (or deep-seated) corneal corrugations (or corrugations of Descemet's membrane), from diminished tension, which are with even less reason covered by the appellation keratitis striata. Classic equivalents of these terms are easily coined.

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PHAKOERISIS

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The evolution of this operation with the difficulties overcome in perfecting it are here described. The manner of using the suction instrument by which one extracts the lens in its capsule is shown in the illustrations. The results attained in one thousand cases done after the method has been perfected are also reported. See also p. 770.

There has been much written and spoken on Phakoerisis, since I presented the first note to the Academies, and many

succinctly the origin and the vicissitudes of the proceeding and instrument; until I got a *modus faciendi* that allowed me

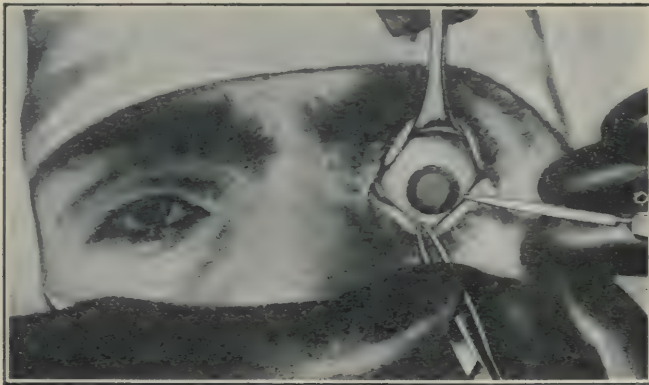


Fig. 1—Operation of phakoerisis (Barraquer); making puncture for corneal incision.

distinguished colleagues have been eager to experiment with a procedure for total extraction of cataracts of all varieties, with the minimum of accidents. But they could guide themselves only by the limited data I had previously published and by the accounts that they could read from the Spanish and foreign oculists, who saw me operating in the School of Medicine of Barcelona. They got a pseudoerisiphake from different makers, trying it without knowing my technic, and without knowledge of how I overcame the first difficulties.

With statistics of some thousand cases, I now have the pleasure of explaining

to obtain excellent results in the cases that I now have the honor to report.

Convinced that we should not make partial extractions, on account of certain imperfections of the method, I tried during a series of months the procedures of total extraction, without complete satisfaction with any of them. I found better the operation which drew out the crystalline lens catching and drawing it, in spite of the brittleness of the capsule; nearly always converting this procedure into an extraction with cystotomy.

I sought an instrument in order to catch the crystalline lens with sufficient strength and to pull it out from the zo-



Fig. 2—Phacoemulsification. Position of knife after making counter puncture.

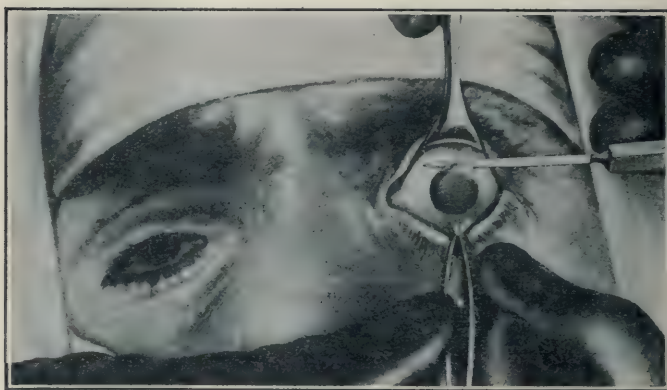


Fig. 3—Corneal section completed, knife forming conjunctival flap.



Fig. 4—Erisophake in position to be introduced thru corneal incision.

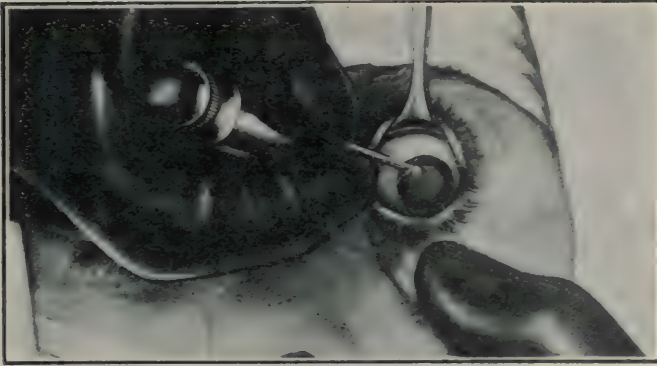


Fig. 5—Erisiphake tip introduced into anterior chamber.

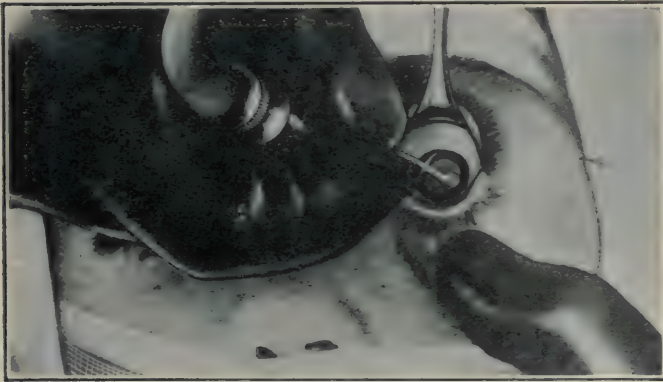


Fig. 6—Erisiphake carried thru pupil in contact with lens.

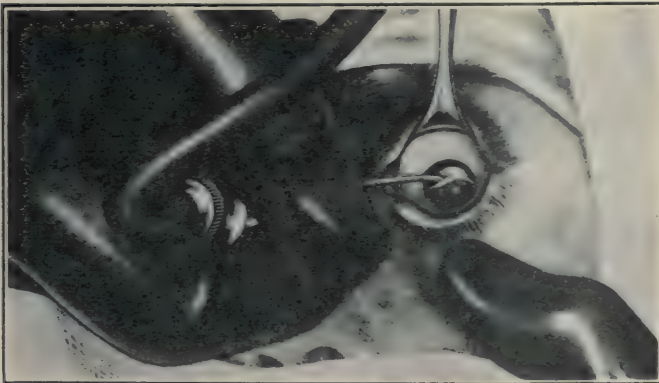


Fig. 7—Erisiphake attached to lens by suction, breaking the suspensory ligament.

nula with sufficient gentleness not to tear its thin envelope. Nature suggested it to me in the tentacula of the polypi, in the fingers of the small green frogs, in the extremities of the leeches that with their vents grasp strongly and without

the canula adapted to the aspirator, thru the incision in a man with ripe senile cataract. When I was convinced that it was impossible to pass it thru the pupil in order to adapt it on the anterior surface of the lens as was my

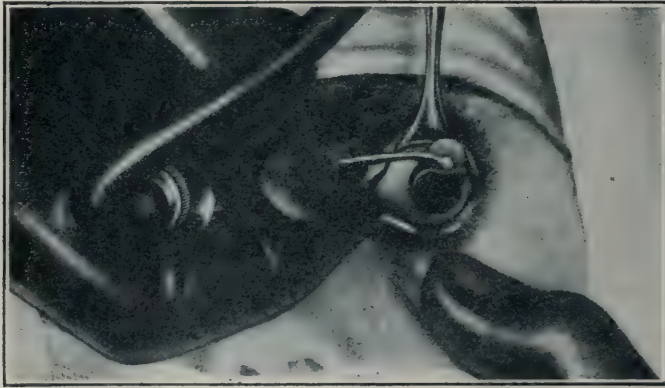


Fig. 8—Lens being drawn from the eye by the erisphake.

violence. Therefore I decided to build an artificial vent that combines the necessary conditions to catch and remove the crystalline lens.

intention, I performed an extensive iridectomy, that permitted me to apply the same canula with the greatest facility. But strong buccal suction caused the ad-

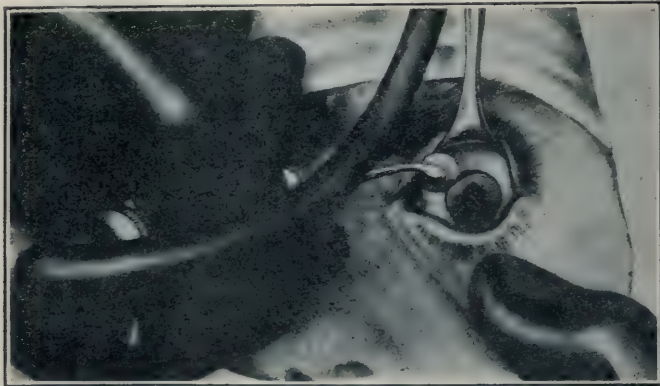


Fig. 9—Erisphake holding lens after its removal from the eye.

The canula of the aspirator of Redar in the shape of a cup served me for my first trial. Theoretically I was convinced that the eyes of corpses or of lower animals would not serve for the trial. Because the conditions of resistance of the zonula, the elasticity of the iris and the consistence of the crystalline lens are very different from those of the patient with cataract. I therefore introduced

hesion, but not with enough strength to pull out the crystalline lens by the breaking of the zonula. After various attempts, during which I tried to increase the vigor of my suction, I succeeded with this first patient. The visual acuity equalled 1.00.

The sizes of this canula were excessive, and the strength of my suction insufficient. I therefore constructed for my

second trial some smaller openings, a receiver with vacuumeter and an aspirating pump; that allowed me to make attempts to determine the proper area of the opening and the intensity of the vacuum. Taking care to recognize that the resistance of the zonula and the friability of the capsule differed with the physical condition of the cataract, the age and the general state of the patient, I made this second attempt on a patient again, with iridectomy; convincing myself by

ple extraction, there were no incarcerated fibres of the zonula, the postoperative hernias of the iris marred the greatest part of my operated cases.

Another obstacle to the simple extraction was the difficulty of going thru the pupil, always smaller than the diameter of the cataract. This difficulty I overcame by having the cataract emerge by the superior edge, placing the tip on the lower part of the crystalline lens, but not to its peri-

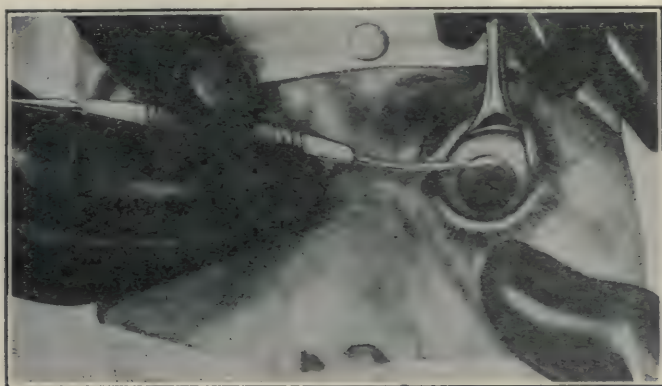


Fig. 10—Toilet of wound after phakoerisis. (Bar raquer.)

the operation, that the intensity of the vacuum must oscillate between 40 and 60 degrees, and must be in direct relation with the hardness of the cataract; and the area of the opening in direct relation with its softness.

In successive attempts, in order to get greater adherence and avoid the breaking of the capsule, I provided my opening with a flat edge, with obtuse limits; and constructed a pneumatic machine, that producing an adjustable vacuum, could communicate to it vibrations which as to frequency and amplitude corresponded to the elasticity of the crystalline lens. Some patients, contrary to what I hoped, had iritis and iridochoroiditis. To avoid the incarceration of the fibres of the zonula in the wound, I attempted, after this, to make the simple extraction, in order that the eserin could withdraw the fibres after the intervention. The great difficulty of introducing the tip thru the pupil compelled me to instill a mydriatic before the operation. Altho in sim-

phery. I give a lever movement forwards of this edge, insinuating it in the pupil. Without this maneuver the resistance of the sphincter loosens the cataract and when the tip is applied again in order to catch for the second time, one might aspirate a portion of the vitreous thru the space left by zonular fibres already broken by the first attempt.

Although the dimensions of the incision were not greater than usual, I often had collapse of the cornea, and inversions of the iris. This I avoided by avoiding the extreme cocaineization that I was practicing in order to get the needful mydriasis; and substituting euphthalmin.

The hernias of the vitreous body have been very rare and always caused by rude movements of the patient or contraction of the orbicularis.

In reviews, letters, and conversations, there has been imputed to this proceeding the necessity of making a larger incision, the danger of submerg-

ing the crystalline lens—objections and accidents arising only thru lack of surgical dexterity on the part of the operator or thru the defects of his instruments.

In the cinematographic films and pictures here, I have shown the results of my first trials. The reader will thus be able to compare the inoffensiveness and the rapidity of the phakoerisis with the repeated maneuvers of cystotomy and the contusions of the eye in the Smith operation; and also to form a clear idea of the technic of my operation.

One should observe the dimensions of the incision, the manner of introducing the tip into the pupil, and the lever movement which is necessary for withdrawing it with the cataract.

Apart from the first groups of cases experimented on in order to determine the technic, that I am now following, the statistics of my first thousand cases are as follows:

In 1,000 operated:

Hernias of the vitreous body.....	7
Inversion of the iris.....	2
Breaking capsule	4
Luxation of crystalline lens.....	3
Infections	2
Hernias of the iris.....	7
Hemorrhages anterior chamber	5
Incarcerations of zonula	5
Expulsive hemorrhages	1

VISUAL ACUTENESS.

0.7 to 1.	694	69.4%
0.3 to 0.7	240	24. %
0.0 to 0.3	63	6.3%
0.0	3	.3%
Conjunctival incision	685	
With previous suture.....	315	
Simple extraction	219	
Extraction with peripheric iridec- tomy	530	
Combined extraction	251	

In closing, I would recommend to my colleagues the use of the phakoerisis in all cases of senile cataract, making a simple extraction in the hard senile or shrunken cataracts, and in docile patients, with good general condition, who are more than sixty years old. Extraction with peripheric iridectomy in the most cases, reserving the iridectomy for the very swollen and beginning cataracts and in young persons. The corneal incision is preferable to the sclero-conjunctival vertex, with previous suture.

The erisiphake must be perfect in all its proportions, and sizes, the valves must move with smoothness and produce the desired effect with rapidity. The source of vacuum must be reliable, and adjustable, and its intensity sustained altho the valves of the erisiphake are opened at times. The vacuum should be vibrating, and its vibration isochronic with that of the lens capsule.

THE SAFEST METHOD OF CATARACT EXTRACTION.

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This paper is an adverse criticism of the Smith or Indian method of extracting cataract in the capsule. It contests the claim that the method is the safest and best for general adoption without denying that it may have a proper place in the practice of certain operators and under circumstances adverse to other methods of operating. Read before the annual meeting of the Medical Society of the State of California, and published thru the courtesy of the society and its journal.

This paper may seem to be more of an attack on the Smith-Indian operation than a detailed description of the safest method of cataract extraction; but I believe it justifiable because, in my opinion that operation is the least safe of all methods.

The patient is certainly entitled to be operated by a method which, for his

age and type of cataract, offers the return of useful vision with the least risk. It follows that all possible measures, operative and postoperative, should be taken to reduce the number of mishaps.

I think it most important to resist the temptation to try the Smith-Indian intracapsular extraction, for as Fuchs states (page 997), "The ideal results ob-

taining in successful cases of this method of operating are purchased at the expense of quite a large number of losses." If this is true, and it undoubtedly is, as shown by comparative statistics, extraction in the capsule by the Smith-Indian method under conditions existent in a civilized population is, to my mind, absolutely inexcusable.

Having worked nearly three years in Manila with a native population similar to that in India I am able to believe that, under those conditions, the Smith operation gives the best average visual results. This is true solely because of the fact that but few of the natives will return for the needlings so frequently needed to complete the result by the capsulotomy method.

Another point upon which Smith lays great stress is the absence of dressings for nine days by which time no more will be needed. This, in the capsulotomy method would be pure neglect. Of course he probably figures that, in doing his operation, he has burned his bridges behind him; and if things go wrong, he can do nothing to help. Certainly this is not true of the capsulotomy method, with which if an accident happens, such as prolapse of the iris, something can be done and the case usually saved as an excellent result. I figure that he was practically forced to work out a labor saving technic in self defense. He was a tremendously overworked man and simply could not have found time to handle his cases as we do. Most of us can not excuse an adoption of his method upon that theory; and our patients will return, with but few exceptions, for the necessary needlings.

When the claims of the supporters of the Smith operation are analyzed we arrive at a very peculiar, and unavoidable, conclusion. Practically all who have learned it in India come back and proceed to write and talk about as follows: The Smith method is the best but takes an exceptionally high degree of operative skill, which skill can be acquired only by performing several hundred extractions behind the smoke screen of Smith's famous cigar. The natural inference does not look

good in black and white. Has anyone of those who traveled to India reported in detail his results in the several hundred operated there? If so it has escaped my observation. All I can say is that, if they had more mishaps than later when they have reached the stage of exceptional skill (self confessed), their "sticktoitiveness" is to be admired.

I wish to admit that I have never tried the Smith operation, not feeling justified in attempting a method that, even at its best, does not equal my results by the capsulotomy method.

An advocate of the Smith method, whose statistics will be quoted later, admits loss of vitreous in 13% of his cases but says such loss is of no moment unless excessive. However, a close study of his cases shows that vitreous loss occurred in 7 out of 18 with less than 20/30 while it occurred in only 11 of 88 cases with better than 20/30—quite a percentage difference. The important point is that once a loss starts it is likely to become excessive certainly more so than if it had not started (the "bull" is admitted but left in hopes of hooking something). Pathology teaches that vitreous does not regenerate and that frequently the portion left does not degenerate and cause retinal detachment. Beard in his *Ophthalmic Surgery* (page 530) has the following to say on this subject: "We have often heard eye surgeons declare that they did not mind a moderate loss of vitreous, and we have often seen apparently permanent good sight, etc., in an eye that had lost vitreous in the extraction. Nevertheless it is a dangerous contingency and one most scrupulously to be avoided. Not the least serious nor the least common of its sequelae is extensive detachment of the retina, and this has a way of creeping slowly and stealthily so that months or even years may elapse before the worst comes." Herbert says in his book on *Cataract Extraction* (page 175): "The connection between vitreous loss and retinal detachment is undoubted." Also on page 176 he says, "Among 122 operations complicated by vitreous expulsion there were 28 failures—presumably failures recognized

before discharge from hospital." He further states that the average loss of vitreous is 3 per cent by the capsulotomy method—this from the records of over five thousand operations by three operators. Taking a 13 per cent loss in the Smith method and basing our calculations on Herbert's figures we can figure 115 unnecessary immediate failures in 5,000 operations. The remote failures would probably be several times this.

OPERATION PREFERRED.

The operation that appeals to me as offering the best visual and mechanical results with the least risk is the old simple extraction using a full upper half corneal incision with conjunctival flap, a peripheral iridectomy, and the removal of the anterior capsule with Kalt forceps. The Kuhnt bridge conjunctival flap is an additional measure of safety that I am using in practically all of my recent cases. When this is made properly, and stitches placed, an incision can be made at the corneoscleral junction outside the area of corneal epithelium; there is no attached flap to interfere with the making of a neat peripheral iridectomy; in case of imminent or actual vitreous loss the flap can be pulled down over the entire wound to give complete support. Besides these advantages it helps to protect against later infection, prolapse of iris, the ruinous accident of insertion of upper lid under corneal flap, and last, but not least, allows the operator to become acquainted with the patient's action under fire before it is too late. I feel that this flap affords far greater protection than the attached and is well worth the time spent in making it; which, so far as I know, is the only argument against its use. We all admit that the simple extraction is far superior to the combined in its cosmetic and visual results. The fear of iris prolapse has prevented its more universal use. The peripheral iridectomy solves this problem and there are now on record many hundreds of operations with a smaller percentage of prolapses than in the combined method. The theory is that it is aqueous pressure that bulges the iris into the wound and that the peripheral button hole furnishes a sluice way for the aqueous. If the combined effect of atropin an hour before

operation, with that of cocain and adrenalin does not give a good dilatation of the pupil the simple operation is not done, and the combined method is done instead. This for three reasons—to avoid the results of sphincter paresis, to shorten time and to lessen pressure. A fourth reason might be given as the difficulty of securing a large bite of the anterior capsule thru a small pupil.

The lens should be extracted with the very least pressure possible and, needless to say, if pressure less than that required to rupture the zonular ligament is always used vitreous loss will never occur unless an added pressure is caused by squeezing, on the part of the patient. I think full anesthesia is almost certain to prevent this occurrence. Patients very seldom squeeze unless hurt.

In order to lessen the amount and duration of pressure I take the following precautions:—

1. Large corneal incision holding in the corneo-scleral junction and ending with a conjunctival flap.

2. Removal of a large bite from the anterior capsule using the Kalt forceps by preference.

3. In the maneuver of expression the use of a very flexible tortoise shell spatula and the Fisher needle. With the former one can see as well as feel the amount of pressure and I do my best to complete the expression without appreciably bending the spatula. As soon as the edge of the lens appears in the wound the Fisher needle is poked into it and the lens lifted out which still further lessens the pressure both as to time and amount.

DRESSING. I simply cover each eye with a thin layer of wet cotton, and build up a thick layer of dry cotton (using wisps) held in place by two narrow strips of adhesive. This serves to keep the lids gently closed without any localized pressure. Over all is placed a wire mask of the type known as the stonecutter's mask. In this way is avoided all chance of pulling on the dressing, such as sometimes happens with the bandage. Moreover, in subsequent dressings there is no need to move the head.

AFTER TREATMENT. First dressing not later than 48 hours by which time if things are all right all dressings can be

omitted. The mask is worn for three weeks to prevent opening of the wound by accidental blows. This I think is very important for a certain percentage of eyes are ruined this way and unnecessarily so.

One of the most important advantages of the above technic is the fact that it is a one man operation. The importance of a trained assistant is a great disadvantage in the Smith method.

DISCUSSION.

At this place it may be worth while to touch on removal by dissection. Jackson, in a recent paper, has argued in favor of extending the age limit for this operation calling attention to the frequent complete absorption of traumatic cataract even in people around forty. The method is slower but is much safer, and it can be carried along as an office procedure. The patients are thus saved considerable expense and loss of time. In case of excessive swelling with hypertension the lens matter is evacuated thru a small linear incision. The case winds up as a simple extraction as far as appearance is concerned. I am now working on two cases of bilateral congenital cataracts in men of 32 and 37. In each I have finished the first eye, in one obtaining 20/20 plus with a perfect cosmetic result. In the other a perfect cosmetic result was secured but a vision of only 20/150 due to partial atrophy of the nerve, the temporal quadrant being very white. In both the media are beautifully clear and of course there is no more corneal astigmatism than before operation.

When to operate. Whenever the patient is disabled is the time to operate. A one sided cataract should be operated as soon as the field of vision is abolished in order to avoid a blind side with its dangers. There is no need to wait for maturity. To help us with immature cataracts we now have the Homer Smith preparatory capsulotomy. Soft cortex usually absorbs, and if a large corneal incision is used there is a better chance of removing more of the cortex with the nucleus. The claim that the Smith-Indian method is the only one for immature cataracts is therefore false.

RESULTS.

A mechanical procedure should be judged by its mechanical results. In the case of cataract extraction this is fair, because the visual result will be good in proportion to the mechanical, provided the perceptive apparatus is normal and the other media clear. Sometimes good visual results occur with bad mechanical, as in the "very updrawn pupil" of the Smith method. We should always try to locate complications in the other media and in the perceptive circuit in order to warn the patient as to possible visual failure. Sometimes it is worth while to operate on such cases merely to obtain peripheral vision and so enable them to find their way about with greater ease. To be on the safe side I always inform my patients that mechanical failure occurs, on an average, in about one out of every twenty cases and that such failure is due usually to misbehavior on the part of the patient or to some unpreventable incident during convalescence, such as sneezing or vomiting. I do not care to operate on anyone who will not take a 20 to 1 chance.

COMPARATIVE STATISTICS.

Because it is the only paper that gives us the results in a series of uncomplicated cases together with an honest notation of all the mishaps occurring during and after operation I have chosen that by the Drs. Green of San Francisco, read before the Ophthalmological section of the A. M. A. in 1917. I am paralleling their 106 cases with 40, but to prove that I am not juggling my records I also include a detailed account of all my unfinished and complicated cases. This number, 60 in all, includes all since I started to practice in California five years ago. Practically all my cataract work prior to that was in Manila under conditions where accurate records are impossible. I doubt if any operator by the Smith method can equal my results even from the standpoint of vision, certainly not from that of freedom from mishaps, operative and postoperative. They also show that even the infrequent operator may expect excellent results if he has surgical sense, a light hand and will use "safety first" precautions.

UNFINISHED CASES.—Eight (one mishap).—Only two of these were refracted and both had membranes. Both refused needlings being satisfied with vision afforded by my extractions on the fellow eye (20/20 and 20/30). The other six never returned for refraction and needlings. All but one had perfect mechanical results. The one exception got out of bed the night of the operation and bumped his way about the ward with both eyes occluded. This resulted in a full opening of the wound, complete iris prolapse and buckling of the cornea. The protrusion was covered in with a wide Kuhnt flap and healed without infection, but of course with incarceration. Pressure bandages rounded the cornea and he wound up with a clear black pupil well down that permitted a beautiful view of the disc. He could count fingers easily at 10 feet without glasses and I believe would have corrected to 20/30.

COMPLICATED CASES.—Twelve (two mishaps).—1. Two extractions, high myopia in each eye with fundus changes. Vision without lenses 20/50 and 20/70. Iris prolapse in one eye from attack of vomiting the morning after operation. This incarcerated but there was a good black pupil and this eye had the better visual result.

2. Vitreous opacities and myopic macular changes. Vision 20/40 thru faint membrane, needling of which she refused. Other eye had same condition but needling gave vision 20/30 and case is included in list of uncomplicated cases.

3. Traumatic cataract dislocated into the vitreous. Luckily it was anchored to the iris by a fine adhesion. Removed without vitreous loss. Beautiful mechanical result; but only a peripheral field because of numerous macular retino-choroidal ruptures. He was satisfied to be rid of the blind side.

4. High myopia. Large white posterior staphyloma. Peripheral vision only. Media perfectly clear, and fundus details focus without lens.

5. Traumatic cataract with fluid vitreous. Many years standing. He was a beggar and operation was done partly in hopes of enabling him to see street intersections (other eye blind), but chiefly to get him out of the cold world during

Christmas holidays. Both "objectives were attained."

6. Two extractions both giving perfect mechanical results. Both corneas hazy from trichiasis. Unable to read but is satisfied to see to get about.

7. Two extractions with vision of 20/30 and 20/40 the reduction being due to corneal haze from old trachoma. Able to read fine print.

8. An unruly patient. From experience with his other eye I foresaw the possibility of vitreous loss; and prepared a Kuhnt flap in advance with sutures placed. Lens was extracted without trouble but during toilet he squeezed, extruding a bead of vitreous and the iris which later incarcerated. Wound up with nice black pupil and had vision of 20/50 at three months, with plus cyl. 5. Final result unknown as he died shortly after from heart failure. There were extensive myopic changes in fundus.

9. A traumatic cataract with piece of steel retained in eye and siderosis. The steel has been in the eye undiagnosed for 18 months. My idea was to remove the lens in hopes of being able later to remove steel thru the pupil. This, however, was not successful at the first attempt. The eye began to clear up and in a month the nerve head could be seen hazily, the vision corrected to 8/100 and of course the blind side was abolished. At this stage he disappeared.

SUMMARY OF UNCOMPLICATED CASES.

Vision 20/15, 12 (30%); 20/20, 17 (42.5%); 20/25, 2 (5%); 20/30, 8 (20%); 20/60, 1. Total 40=97.5% 20/30 or better.

The two cases of 20/25 were in the same person who was a diabetic, this being the vision a year after operation, and after the subsidence of an attack of acute hemorrhagic retinitis.

Five of the 20/30 cases had faint pupillary membranes in which the vision could have been improved by needlings and thus added to the 20/20 list; one of this list had myopic macular changes and vitreous opacities.

The case listed as 20/60 had this on the 14th day about which time a low grade cyclitis with vitreous haze developed. The operation and its immediate result had been perfect. She disappeared from treatment and I can-

not give the final result but it was probably bad. The cause might have been a focal infection.

MECHANICAL MISHAPS, 4 in number, all prolapses, 10%. Two were excised and replaced. Another was large and due to gross misbehavior on part of patient. However all wound up with 20/20 or better. So no permanent harm was done.

Summary of Greens' Uncomplicated Cases.

20/15, 40 (37.7%); 20/20, 24 (22.6%); 20/25, 9 (8.5%); 20/30, 15 (14.1%); 20/40, 6 (5.5%); 20/60, 4 (3.7%); 20/80, 1; 20/100, 3; 20/120, 1; 20/200, 1; 10/200, 1; 1/200, 1. Total 106, 82.9%, 20/30 or better.

Mishaps.

A. Among cases giving better than 20/30 (88 in number).

1. Vitreous loss in eleven cases.
2. Prolapse of iris in six.

3. Incarceration of iris in one.
4. Secondary iridectomy for up-drawn pupil in six.

5. Secondary operation for ruptured capsule in two.

6. Updrawn pupil in three.

7. Capsule rupture in five.

B. Among cases giving less than 20/30 (18 in number).

1. Vitreous loss in seven.

2. Pupil drawn up in two.

3. Capsule rupture in two.

4. Iris prolapse and glaucoma later in one.

5. Iris adherent to wound and glaucoma later, in one.

6. Pupillary exudate in one.

Altogether about 45% of serious mishaps, in 18 cases, reducing the vision in varying degrees from 20/40 to 1/200. Compare this with my 10% of mishaps all of which finally wound up with 20/20 or better.

My Uncomplicated Cases (40 Completed).

	Vision.	No.	%
97.5% with 20/30 and better which includes three cases with macular disease, two of which were diabetic, the other myopic with vitreous opacities.	20/15	12	30.
Accidents. None at operation. Four iris prolapses found at first dressing. In one of these a peripheral iridectomy with replacement and two complete excisions gave as perfect results as the primary. The other wound up with incarceration. All had 20/20 or better.	20/20	17	42.5
A total of four operative mishaps only one of which wound up as a bad mechanical but even this one gave a visual result of 20/20.	20/25	2	5
Five of the 8 cases listed as 20/30 had faint membranes, the needling of which would have moved them into the 20/20 or better class.	20/30	8	20
	20/60	1	2.5
	40	100	

Greens' 106 Uncomplicated Cases.

82.9% with 20/30 or better. In the 88 cases with better than 20/30 the following mishaps occurred:—vitreous loss 11, prolapse of iris 6, incarceration iris 1, updrawn pupil 3, rupture capsule (technical failure) 5, secondary iridectomy 6, secondary operation to remove capsule 2. Total 34 = 38.6%	20/15	40	82.9
Updrawn pupil in 2, vitreous loss 2, iri prolapse 1, not stated in 2 (one duplication).	20/20	24	
Vitreous loss 3, capsule rupture (failure) 1	20/25	9	
Capsule rupture (failure) 1.	20/30	15	
Visual test not satisfactory 1 (mental defective), iris prolapse and glaucoma 1, large vitreous loss 1.	20/40	6	5.5
Iritis and chronic uveitis. Broken point of knife in eye.	20/60	4	5.5
Large vitreous loss—patient unruly.	20/80	1	
Pupillary exudate—noninflammatory.	20/100	3	
Adhesion of iris to wound and secondary glaucoma	20/120	1	
	20/200	1	
	10/200	1	
	1/200	1	

Fisher, of Chicago, reports 94 intra-capsular extractions with following results: 20/20, 56 (60%); 20/20 to 20/40, 12 (12.5%); 20/40 to 20/65, 9 (9%); 20/65 to 20/100, 9 (9.5%); 20/100, 5 (5.3%); eyes lost 3 (3.2%).

He gives the following as the cause of the poor results: iridocyclitis in 3, glaucoma in 4, ruptured capsule (failure) in 3, detached choroid in 1, hemorrhage of choroid in 1, drawn up pupil in 1, detached retina in 1; a total of 14 serious mishaps in 94 cases without mention of vitreous losses.

Where is the sense of humor of an individual who can recite such a list of mishaps as those listed above by both Fisher and the Greens, and then state that the method responsible for them is the best?

I would like to conclude this paper by quoting in full Beard's idea of the status of the Smith operation as given

in his *Ophthalmic Surgery* (pages 573 to 576). But to save time I will merely refer to that, and quote the last paragraph. "When the time arrives that the average operator can rid the eye at once of cataract, subcapsular cortex, and capsule with as little ultimate damage to the integrity of the organ as it now incurs from the best chosen of other methods, ophthalmic surgery will have made an enormous step in advance. That such a time has not arrived no one can deny, and few perhaps are so optimistic as to believe that it is near."

A grand total of 51 mishaps in cases listed and considered before operation to be uncomplicated. Only one stated as being in an unruly patient. Their record betters mine only in the percentage of 20/15 cases but it is quite apparent that this unimportant gain was "purchased at the expense of a large number of losses."

A CASE OF INTRAOCULAR SARCOMA WITH UNUSUAL OPERATIVE HISTORY

EDWARD C. ELLETT, M.D.

MEMPHIS, TENN.

The case here reported and others referred to illustrate the importance and difficulties of the diagnosis of intraocular tumors. Read before the American Ophthalmological Society, June 1920.

Mrs. M., aged 52, was referred to me in February, 1917, by Dr. H. T. Collier, of McKenzie, Tenn.; for an affection of the right eye. Six months before that time, namely in October, 1916, the vision in the right eye began to fail and the field of vision to contract, until she could see objects only in the lower temporal field. There were no other symptoms referable to the eye until ten days before I saw her, when the eye became totally blind, red and painful. During this time, especially for the last month, she had not been well otherwise, the symptoms being referable to the abdomen, but her physician and consultants had not been able to find any definite pathologic condition.

The left eye was found to be normal in every way except for 1.50 D. of hy-

peropia, the correction of which gave her normal vision. The right eye was blind, greatly inflamed and painful, the pupil widely dilated, the anterior chamber shallow, and a grayish reflex was obtained from the vitreous, no red reflex being seen and no details of the eye ground being made out. Transillumination of the eye was not practiced. The tension was plus two. With the McLean tonometer the tension was between 90 and 100, and with the Schiötz, 57. In other words the eye presented all the signs of acute glaucoma.

On account of previous experiences, two of which will be presently related, I was suspicious of the eye, and was unable to banish from my mind the possibility of intraocular tumor. I expressed this fear to the patient's hus-



Fig. 1—Section passing thru the nerve head and showing the tumor mass on each side, but not involving the nerve.

band, but advised operation for the glaucoma. This was agreed to, and on the following day a corneoscleral trephining, with iridectomy, was done, under local anesthesia. The operation was very painful, but technically satisfactory, and the dressing was applied with the eye looking as it should in every respect. There was no special

complaint during the ensuing twenty-four hours, but on removing the dressing the next morning a large smooth dark mass was seen to protrude from the trephine opening. It was approximately spherical, and about 10 mm. in diameter. It had pushed the conjunctival flap down on the cornea, and could be seen to protrude from the

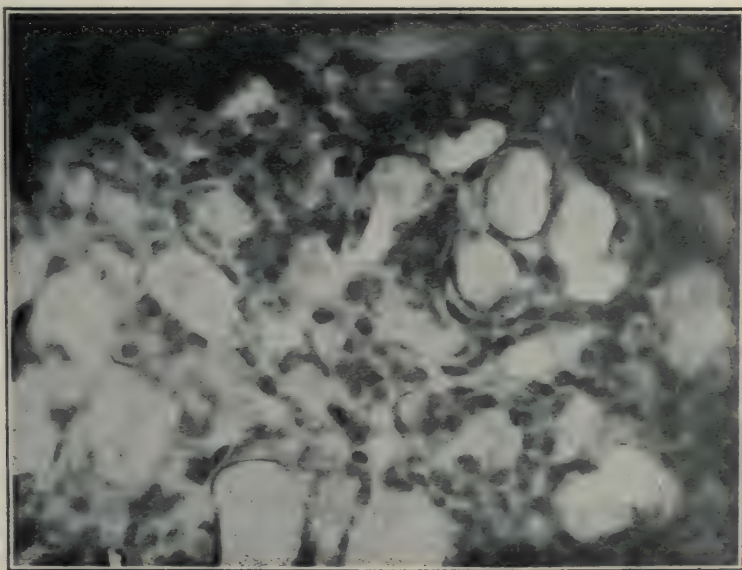


Fig. 2—Microphotograph of tumor.

trephine opening. It was large enough to have contained the lens, and seemed to be covered with the iris and choroid. The suspicion of intraocular tumor was now so strong that removal of the eye was advised and practiced. The recovery was prompt, tho the patient continued to feel sick and weak from symptoms which she referred to her stomach. Further examination at this time by an internist, did not disclose the cause. She soon returned home,

The size of the tumor was such, taken in connection with its location, that transillumination by the ordinary methods would not have suggested its presence, tho the small light suggested by Dr. Allen Greenwood to be introduced into the orbital tissues behind the ball, might have given some assistance.

The two previous experiences referred to above are the following. Many years ago, while House Surgeon



Fig. 3.—Section passing thru the trephine opening. The conjunctival flap is seen pushed up at right angles to the cornea. Retina and vitreous pass thru the opening. Lens in position, but suspensory ligament is pulled toward the opening.

and died the following summer. I do not know the exact cause of death, but was told she had some form of abdominal growth.

The eye was divided equatorially, and each half was divided anteroposteriorly. At the posterior pole of the eye, surrounding the optic nerve and lying mostly to its lower and inner side, was a new growth, about 7x11 mm. in extent, and 3 mm. thick. The retina was totally detached and not connected with the growth. Sections of the growth showed it to be a slightly pigmented sarcoma. In the anterior half of the eye the trephine opening was well seen, and thru it had prolapsed parts of the retina and vitreous. These conditions are all well shown in the illustrations.

at the Will's Eye Hospital, my colleague, Dr. W. R. Parker, and I undertook to work up some of the pathologic specimens that had accumulated in the museum. Among other eyes, we found one of a woman, aged 50, with the history that she had awakened with a feeling as if something had given way in the eye. The eye protruded slightly, was stony hard, and there was a marked iridocyclitis and a tendency to scleral staphyloma in the temporal portion of the ball. The diagnosis was "Absolute Glaucoma." Sections of the eye showed a round celled sarcoma of the choroid.

About ten years ago, one of my associates did an iridectomy for acute glaucoma in an eye that had been blind for two years, but had not been seen

by him until the acute attack appeared. His diagnosis was "acute glaucoma in an eye blind from chronic glaucoma." The wound did not heal, but its edges continued to pout and the anterior chamber did not reform. I saw the patient after this state of affairs had lasted two or three weeks, and it seemed to me that something must be pushing the lens and iris forward, and

examination or from reports of previous examinations by others, what was the cause of the blindness. It is accepted, and stated in standard text books, that simple glaucoma often passes into inflammatory glaucoma, but when my attention was called to the matter I was not sure that I could certainly recall a case in which I had seen this occur. Inquiry among others

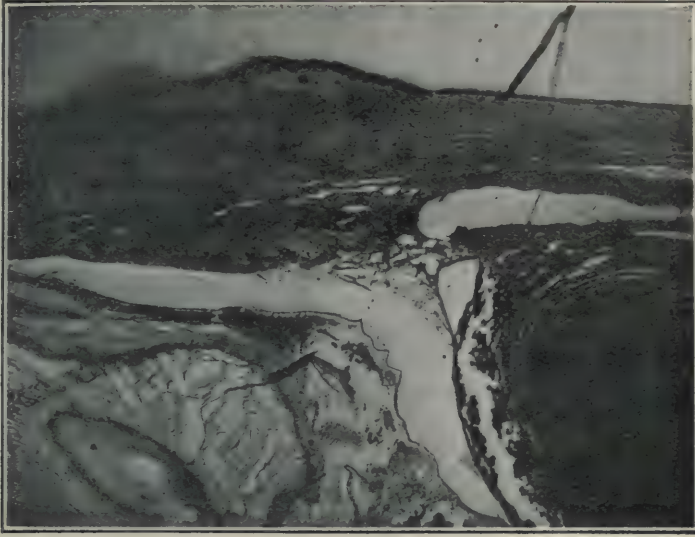


Fig. 4—Angle of the anterior chamber opposite the trephine wound.

that this something was most apt to be a growth. The vision, tested at this examination for the first time, was found to be reduced in the fellow eye, but normal with a -1.00 D. lens. Two days later the vision was worse, the pupil small, and tho there was no redness or pain in the eye, it was impossible to dilate the pupil with atropin. In short, there was a sympathetic ophthalmia, which prompt removal of the operated eye did not arrest, and the eye went on to blindness. The enucleated eye was found to contain a tumor.

Such experiences make one very suspicious of acute glaucoma in eyes that are already blind, at least in those in which we cannot say, from previous

showed that many had the same to say, but since looking for them I have found several such cases, some in which the sight was lost before the attack of acute glaucoma, and some in which it was not. My own limited experience, therefore, confirms the prevailing idea that acute glaucoma can and does develop in eyes which are the seat of a chronic inflammatory glaucoma. Nevertheless, in acute glaucoma in eyes that were previously blind from an unknown cause, the possibility, even the probability, of intraocular tumor as a cause must not be lost sight of, and the safest plan in such a case is to enucleate the eye.

VISUAL FIELD FINDINGS IN A CASE OF BRAIN TUMOR

WALTER R. PARKER, B.S., M.D.

DETROIT, MICH.

The progressive changes shown in the visual fields of this case are of especial interest in connection with the post mortem examination showing the location of the tumor that caused them. Read before the American Ophthalmological Society June, 1920.

The visual field charts here shown were taken from the records of a case of brain tumor involving the left optic tract, the chiasm, and the adjacent brain substance.

CASE. A brief outline of the history is as follows: J. M., aged 28, first came under observation in 1911. At first a

1911, the vision in the right eye was 6/15; left eye 6/12. Pupillary reaction was present, but somewhat sluggish, especially in the right eye. Wernicke's sign present.

Ophthalmoscopic examination showed edema of both optic discs, most marked in the right. No measurable swelling

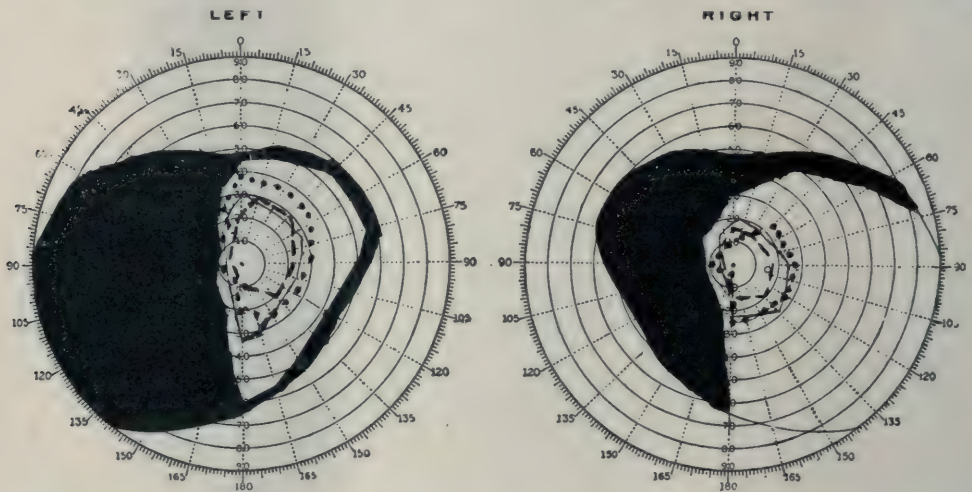


Fig. 1.—Fields of vision, May 5, 1911. Boundaries of color field: red, dotted line; green, broken line; blue, continuous line.

private patient, later in Ophthalmic Clinic at University of Michigan. He was a sailor on the Great Lakes and was sent home on account of inattention and inability to keep awake when on watch. There was nothing in his family history of importance and his personal history was negative until the time of onset of his present disease. Four years previous to the time of the first examination he suffered attack of headaches, general in character, but not severe. About two years later the pain in the head increased in severity and frequency and was often accompanied by nausea and vomiting, with occasional brief attacks of vertigo and falling sensation. He never complained of loss of vision. When first seen in

present. Visual fields showed an homonymous hemianopsia, without involvement of the macula.

The headaches did not increase in severity while the patient was under observation until within a few months before his death but the mental and motor disturbance gradually became more marked. The patient had a sense of well being and often insisted he could go back to his ship and do his work "if only he could see." Later he developed a left limb and acromegaly with other symptoms of hyperpituitarism.

At the time of the onset of the symptoms referable to involvement of the pituitary gland, Dr. R. B. Canfield did a sellar decompression operation by

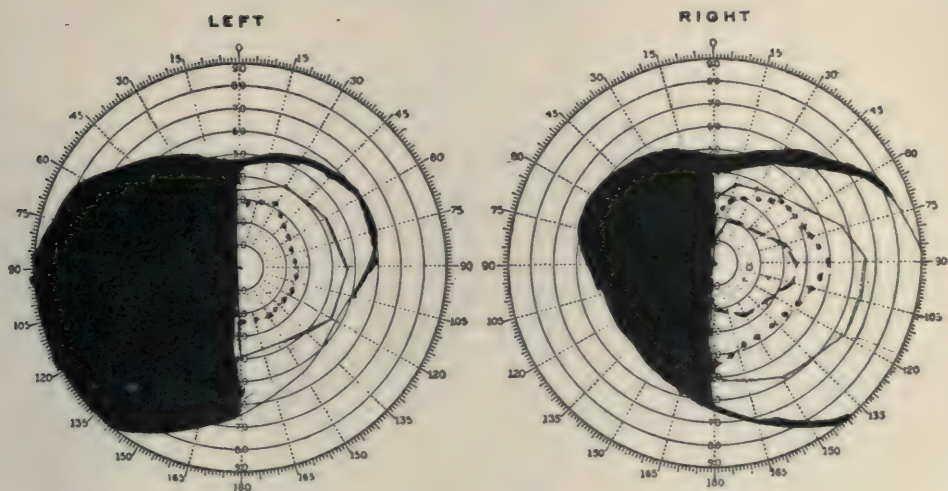


Fig. 2—Fields of vision, December 12, 1912. Color fields as in Fig. 1.

the transsphenoidal route. A portion of the tumor was removed and submitted to pathologic examination by Dr. A. S. Warthin who reported the tumor to be a large round celled sarcoma.

As the gland lost its functioning power due to the invasion of the tumor, symptoms of hypopituitarism succeeded those of oversecretion of the gland. These changes became noticeable shortly after the sellar decompression operation.

The patient died April, 1914. Post mortem examination revealed a large

tumor involving the right tract, chiasm, and adjacent brain substance. Pathologic report: Large round celled sarcoma with numerous calcareous concretions (psammoma). Growth probably primary in the meninges.

The visual fields were of particular interest, showing at first an homonymous hemianopsia without involvement of macular region. Vision O.D. 6/15; O.S. 6/12 (Fig. 1). Later the macula became involved. Vision right eye 1/60; left eye 5/30 (Fig. 2). Still later there was a loss of green perception in the right eye with a marked

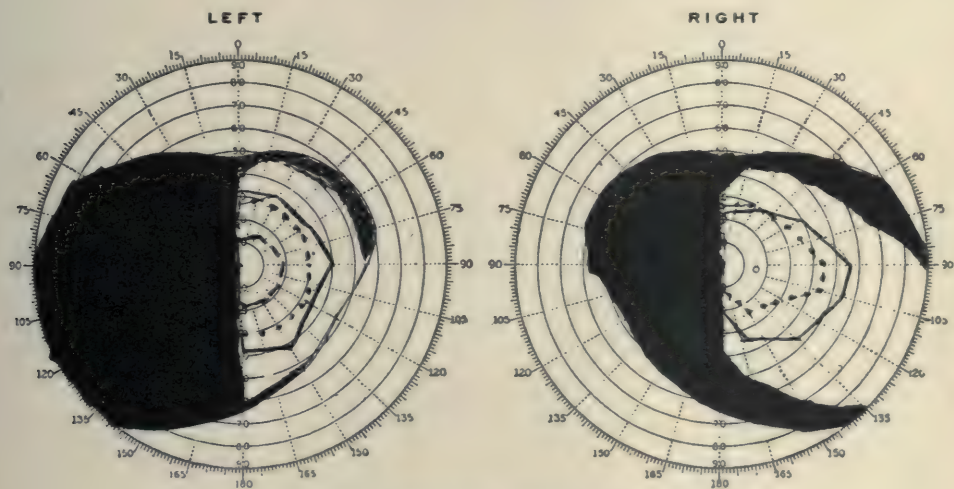


Fig. 3—Fields of vision, February 26, 1913. Color fields as in Fig. 1.

contraction of the temporal form field (Fig. 3). This condition in time was followed by loss of all color sense in the right eye with more marked temporal contraction for form. Vision,

jerk markedly exaggerated, slight memory defect. Wassermann negative; urine negative.

DISCUSSION. To produce the field changes here shown the tumor ap-

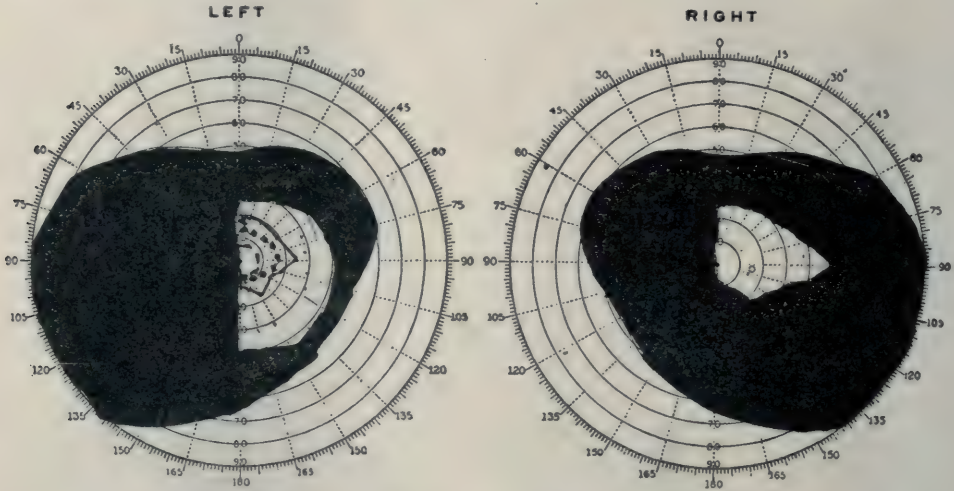


Fig. 4.—Fields of vision, October 24, 1914. Color fields for left as in Fig. 1

fingers at 2 feet (Fig. 4). Finally total blindness in the right eye (field not taken).

The optic disc in each eye at first edematous, with no measurable swelling, gradually paled, and finally became atrophic thruout. The neural examination made by Dr. C. D. Camp, March 11, 1912, showed general muscular weakness, slight difficulty in turning to the right, no nystagmus, power of convergence normal, slight facial paralysis, positive Romberg, knee

parently first involved the right tract, inducing a left homonymous hemianopsia and a positive Wernicke sign. Later it either invaded the chiasm or led to pressure symptoms that affected only the papillomacular bundle causing loss of central vision.

Finally a possible bitemporal hemianopsia developed and this superimposed on an homonymous hemianopsia led to blindness in one eye (right) and loss of temporal field in the other.

SAFETY PROCEDURES IN THE OPERATION OF SENILE CATARACT.

H. W. WOODRUFF, M.D.,

JOLIET, ILL.

This paper gives certain practical measures for avoiding dangers that beset cataract extraction. It especially emphasizes the value of complete anesthesia; and of leaving a bridge of tissue in the corneal incision until the speculum is withdrawn, when it may be divided with the scissors. Read before the Colorado Congress of Ophthalmology and Otolaryngology, July 23, 1920.

During the operation of cataract extraction, prolapse of vitreous may occur at any stage after the beginning of the incision. Minimize the importance of this occurrence if you will, it is nevertheless one of the most dreaded complications of this operation, for it may mean the loss of the eye. Frequently it means greatly reduced vision thru permanent opacities in the vitreous chamber. Often the pupil is drawn upward on account of retraction of the iris. Also the more serious complications of retinal detachment, choroidal hemorrhage and irido-cyclitis may accompany or follow the accident.

The most frequent cause of prolapse is pressure by the operator or by the patient; the vitreous escaping either with the lens or immediately after. It may occur as soon as the section is completed from contraction of the orbicularis or recti muscles. There may be complicating conditions from disease or injury which has caused atrophy or rupture of the zonula.

Much has been written regarding the character of the section; and of various instruments, as eye specula and lid retractors, by which the frequency of the occurrence may be lessened. I believe I have seen it occur more frequently from insufficient anesthesia than any other one cause. I well remember seeing one of the chief promoters of the intracapsular method lose vitreous in two cases out of four operations in one afternoon, in his own operating room and with his own trained assistant. I am quite sure it was due to insufficient anesthesia primarily, altho the method itself increased the hazard.

So much has been said about the effect of cocain upon the corneal epithelium that operators may and do err on the side of using too little rather than too much. It is pain, sudden and acute

pain, which causes the patient to "squeeze" his eye.

Another promoter of this operation in this country following the practice of Col. Smith, used and advised one drop only of a two per cent solution of cocain. He has long since abandoned this practice and now uses a subconjunctival injection of cocain for anesthesia in addition to its instillation into the conjunctival sac.

Inexperienced operators are apt to make too small an incision. This is of no serious consequence if the operator recognizes the cause of the failure of lens to present and enlarges the incision with the scissors. I have seen vitreous prolapse brought about by the persistent attempt of the operator to extract a lens thru an insufficient opening. There is no need in this country of using dull instruments. I believe Col. Smith does one hundred operations with the same knife. The traction on the eye ball is in direct proportion to the dullness of the knife. The zonula may be easily ruptured by the traction caused by dull instruments. It is better to have a fresh knife for each operation. This is of more importance than the particular shape which may be advocated by various operators.

Vitreous is occasionally lost after the operation is completed and the operator attempts to remove a blood clot from the wound. This is one of the most regrettable accidents because it is so unnecessary. I have known this to happen to two of the most skilled operators. One was using a cotton sponge to wipe the blood from a conjunctival sac and the other was using forceps. In both these cases, after very slow recovery vision of only twenty two-hundredths was obtained on account of the opacities in the vitre-

ous, which followed. In these cases, the speculum should have been out or the patient should have been told that the eye was to be touched.

Some operators believe it to be good practice to cut off the eye lashes. At the Illinois Charitable Eye and Ear Infirmary, someone started this practice and it was followed with my cases until I had this experience: I was operating upon a woman who could neither speak nor understand English, neither could an interpreter be found. I find the eye lashes are very useful to serve as a handle. The lid can be picked up and drawn over the corneal flap. In this case after the extraction was done and the speculum removed, the lid brushed down into the wound. The patient kept opening and closing the eye and with every movement there was a continuous prolapse of vitreous. With the lashes present, the lid could have been held over the eye until the patient could have been made to understand that she was to keep the lids closed.

In November of last year, a man of 76 was brought to the Illinois Eye and Ear Infirmary with double senile cataract. His general physical condition was good; but his mental condition was poor. He was in the early stages of senile dementia. One could gain his attention by talking to him; but his mind would wander from a subject very quickly. His son was made acquainted with the danger of operating upon a patient in his mental condition; but was of the opinion that it was worth while to make the attempt, an opinion with which I concurred and which the after results showed were wise. When I arrived at the hospital on the day of the operation, the male attendant, who has been long in the service and who exercises the privilege of free speech, often accorded such faithful employes, "hoped that I would not operate."

The patient had been out of bed wandering over the hospital not knowing where he was. The stage was well prepared to save the nurses and attendants this additional care, which a

crazy man with a freshly operated eye would give them.

I am not relating this case to argue especially in favor of operating all such cases and was hesitating myself, as many of you have done in the same situation. So I asked the intern if I should operate or not. His reply was characteristic: "If you wish to allow the attendant to dictate what to do with your patients, don't operate." I replied "We will operate." Anesthesia was secured by a ten per cent solution of cocain. The puncture and counter-puncture were made and the incision begun when the patient began to lose control of himself and started to "squeeze the lids." He would stop when spoken to and began again as the cutting was resumed. Realizing we were in for a vitreous prolapse if we kept on, I withdrew the knife before the incision was quite completed, leaving a scleral bridge of perhaps 3 or 4 mm. in length. At this time I did not know any more than my audience did, how I would complete the operation; but I did feel that the patient would expel the contents of the eye ball if he could; and I did not intend to give him the opportunity. The speculum was removed, a few more drops of cocain solution instilled and after waiting a few moments, the lids were slightly separated with the fingers and the incision completed with the scissors. We have at the infirmary, scissors designed for the purpose of enlarging a corneal incision if made too small but a pair of Stevens' curved tenotomy scissors will answer the purpose.

Iridectomy was performed and capsulotomy also without the use of speculum or retraction. The lens was expelled by pressure of the fingers on the lids. This patient made an uneventful recovery and his mental condition was very much improved so that everybody concerned was delighted with the results.

It occurred to me that if this procedure of temporarily leaving a sclero-corneal bridge would help to guard against vitreous prolapse from fault of the patient, it might also be useful in

cases where the zonula was known to be ruptured as in dislocated lenses, traumatic cataracts, diseased fluid vitreous, etc.

A. P., a private patient, 57 years of age, presented himself with a luxated cataract. Two years before he had been struck in the left eye with a piece of wood. Vision had very gradually failed; but he had been blind only about three weeks before he came for an examination. The anterior chamber was shallow and the iris tremulous. It was not until the pupil was dilated that it could be plainly seen that the lens was luxated to the temporal side. Knowing that vitreous prolapse would certainly follow the ordinary incision, I followed the method used in the previous case and succeeded in completing the incision without any loss of vitreous. The iridectomy was performed with very slight loss and the lens extracted with the wire loop with a slightly increased amount of loss. Vision of 6/12 was obtained with $+9$ $+1.00c.$ ax. 180.

I believe this method of making the incision is the acme of precaution in guarding against vitreous loss and

shall advise it and follow it in these two types of cases.

Conclusions:

1. Vitreous prolapse is less apt to occur if anesthesia is thoro. Use enough cocain rather than too little. Softening of the corneal epithelium is of little consequence compared with vitreous prolapse.

2. Incision must be large enough so that moderate pressure causes the lens to present. The incision is easily enlarged with scissors if originally made too small.

3. The knife must be as sharp as possible to avoid unnecessary traction on the eye.

4. After the operation is completed, do not touch the eye without a word of caution to the patient and better have the speculum removed.

5. Do not allow the cilia to be removed.

6. In cases where vitreous prolapse is a probability, either from lack of self control on the part of the patient or from diseased conditions in the eye itself, do not immediately complete the corneal section with the knife; but remove the speculum and complete the incision with the scissors.

DELIRIUM FOLLOWING CATARACT AND OTHER EYE OPERATIONS.

WILLIAM A. FISHER, M.D.,

CHICAGO, ILL.

After reviewing the literature of this subject a summary is given of what it contains regarding etiology and treatment. The author's recent cases are mentioned with details of one of them, and conclusions drawn from the study and experience. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology, July 23, 1920.

LITERATURE. Altho it has been known since the middle of the 17th century that delirium followed certain surgical operations, Dupuytren¹ in 1819, was the first to direct attention to the special delirium following cataract operations. In his clinical lectures on cataract, he reported that in twenty-one cases he had observed nervous delirium in two of them. The symptoms disappeared in a few days after the use of antispasmodics. The delirium was distinct from delirium tremens.

Since Dupuytren's paper was published (just 100 years ago), twenty-nine other papers on this subject have been recorded. In 1863 (59 years after the first recorded case) Sichel² reported eight cases, all in old people, and described the condition as a febrile delirium due to closure of the lids and loneliness. Magne³ and Lanne⁴ also described some cases in 1863. Magne thought the condition was due to diet changes causing stomach trouble. Warlomont⁵ in 1865 described a case in which the patient tore off the ban-

dages without relieving the delirium. In this case he observed that the delirium which was absent during the day returned at night, despite the presence of light in the room. Arlt⁶ in Graefe-Saemisch's Handbook, 1874, wrote: "In old patients, much run down and nervous, mental disturbances may occur during the few days following operation." He advocated uncovering the unoperated eye.

Schmidt-Rimpler⁷ was the first to try to explain this phenomenon. In 1878 he reported two cases: a woman of fifty-seven years with iritis and a young man of nineteen years with iridochorioiditis, operated by iridec-tomy. He tried to ascribe the delirium to the darkness resulting from the dressings and the retention of the patients in a dark room. He thinks that in a human being blinded (temporarily or not) ideas can arise, not attenuated or corrected by the sight, which will provoke superexcitation bordering on hallucination. He also showed that such psychoses can develop without operation when the eyes are bandaged and the patient kept in a dark room. When the eyes are closed to outward impressions a sort of dream life is experienced. Since both patients were alcoholic, he believes that predisposition is an exciting cause.

Schnabel in 1878⁸ first laid emphasis on the factor of senility since all the cases up till then were patients averaging around seventy years of age. He attributed the delirium to circulation disturbances involving brains atrophied by senility. He had seen twelve cases of delirium in 183 cataract operations from 1877 to 1880 in the Innsbrück Clinic.

Hirschberg⁹ reported a case in a man of sixty-seven years operated by iridec-tomy for glaucoma of the right eye. Twelve days later he showed symptoms of delirium. Despite removal of the bandages the patient could not sleep and the delirium continued. It recurred the following day but less violently, and the next day he regained his reason, but did not remember anything of the crisis. Hirschberg thinks that deprivation of the sense of vision

and derived impressions starts the delirium. Kretschmer¹⁰ and Landesberg¹¹ reported five cases between them about this time.

Webster¹² reported a case of meningitis and death following cataract extraction. The patient was a man aged seventy-six years, who had lost the sight of his right eye nine years before by injury, his left eye now operated for black cataract. "The patient developed a condition akin to dementia on the second day, chemosis on the fourth day, well marked panophthalmia on the eighth day, vomiting with loss of power over his sphincters on twelfth day, and died on the twentieth day after operation. The diagnosis of meningitis was confirmed by a member of the Neurological Staff who saw the patient."

Parinaud¹³ reported three cases in 1890. He gives these explanations: (1) the preoccupation of the patient during the days preceding the operation; (2) occlusion of the eyes, which by isolating the patient from external ideas puts him in a condition favorable to delirium; (3) the regime to which the patient is submitted. In his own case neither alcoholism nor atropin could be incriminated.

Frankl-Hochwart,¹⁴ attributed the delirium to the fear of losing the eyesight. Martin¹⁵ doubted this and said: "The delirium of the operated is a nervous delirium, its predisposing cause being an alcoholism, and its occasional cause being the deprivation of drink." Frankl-Hochwart recognized four groups. (1) Hallucinatory insanity in nonalcoholics; (2) simple mental confusion in senile patients; (3) delirium in alcoholics; (4) inanition confusion in very reduced individuals. Valude¹⁶ reported a case in which after forty-eight hours of delirium the patient became normal after the removal of his bandages.

Berry¹⁷ reported an epileptic seizure after cataract extraction in a woman of seventy-two years. There was no previous or subsequent history of epileptiform seizures; there was, however, heavy hemorrhage from the operation. He had seen three cases of delirium

after cataract extraction; one the result of atropin poisoning; in the others, no apparent cause. In 1896 Lowy¹⁸ reviewed the literature and reported a case of his own in which he believed senility to be the principal factor in the delirium.

Posey,¹⁹ in 1900, reported twenty-four cases, nineteen after removal of cataract, three after iridectomy, two after extensive eye injuries. He believes that the cause is principally physical, and recommends chloral and bromides in the treatment of delirium. In the discussion of this paper many cases were mentioned and the treatment recommended was the removal of the bandage from the unoperated eye and getting the patient out of bed.

Fromaget²⁰ attributed the delirium to intoxication and quoted literature in support of the view that post operative delirium in other operations is due to intoxication. In two cases operated by him for cataract the delirium was present at night only. He believes the intoxication is an autointoxication due to disturbances in the emunctory function and retention of urea. The changes in occupation and diet, medication, etc., the emotion accompanying the operation, all tend to weaken the already debilitated eliminative powers of the aged. Since cataract operations are generally performed on the old, he concludes that the delirium is due to auto-intoxication, which is a product of senility. Postoperative deliriums are the deliriums of dreams. Tho in itself not a cause, occlusion of the eyes puts the patient in a state of hypnosis and is conducive to sleep or pseudo sleep. This state, plus the stirred imagination attendant upon the operation, incites to dreams and delirium. He does not think that postoperative delirium is always autotoxic, but in ophthalmology he believes it is almost always so.

Kipp²¹ reported twelve cases in 1903, of which two were very transient. All the cases occurred after surgical operations or accidental traumatism of the eye. They all occurred in the wards of eye hospitals. Some patients occupied dark rooms, but were mostly

treated in well lighted rooms, with other inmates. Some were sitting up or walking about, and only one of these had both eyes bandaged when the delirium commenced. The majority of the patients were over fifty years old, all were mentally sound on admission and in good general health. In the large majority atropin had been instilled several times daily. Recovery from the mental trouble resulted very speedily in all cases, in which the patients could be returned to their homes immediately after the outbreak. He, therefore, thinks that the psychoses were the result of a change in the patients' environment and a longing to get away from hospital surroundings. He believes it is a nostalgia ending in melancholia.

Finlay²² reports a case of violent delirium on the night of operation in a woman of sixty-six years operated for mature senile cataracts in both eyes. Urinary examination of this patient revealed uremia, which was taken to be the cause of the delirium. There was no question of a dark room, atropin was not used and homesickness was excluded. There had, however, been cause for worry besides the shock of operation, which evidently brought about the renal insufficiency. He thinks that occlusion of both eyes is secondary, and that this case corroborates Fromaget's theory of uremic origin of delirium.

David²³ published twelve cases of delirium following cataract operation, occurring in 3.32 per cent of the cases operated for cataract, over a period of four years in the ophthalmologic service of Lariboisière, Paris. It is only a variety of postoperative delirium, usually beginning early and accompanied by thermic elevation. The causes are multiple, such as nervous predisposition, senility, apprehension in the patient, darkness, binocular bandaging, isolation, diet, etc. The condition shows great symptomatic polymorphism, ranging from simple mental confusion and dream delirium to violent agitation and terrifying hallucination. He states that the best prophylactic treatment is complete examina-

tion of the patient before and careful surveillance after the operation.

Casey Wood²⁴ states that the mental balance of old people is especially prone to be disturbed by putting them in a dark room of a strange hospital, to say nothing of the anxiety connected with a serious operation. The majority of insane patients recover under sedatives and judicious suasion. In every case the condition of the bladder, pelvis, urine and blood should receive attention. Care should be exercised to prevent a temporarily insane patient from tearing off the bandages and otherwise injuring his wounded eye.

Hulen²⁵, who never had a case of delirium following cataract extraction, thinks that this is due in a great degree to the preliminary preparation of the patient physically and mentally. He uses Ring's mask, thus dispensing with a dark room and thoroly protects the eyes from accident.

Parker²⁶ succinctly discusses the occurrence of psychoses after operation generally and their cause. Parker's cases are from the Ophthalmic Clinic of the University of Michigan from 1908 to 1912 inclusive. They include cataracts of all kinds in the young and old. There are eleven cases of cataract delirium in 376 cataract extractions (seven in 233 males, four in 143 females). Average age of males 74.28 years; of females 68 years. The psychoses began from twenty-four hours to six days after operation. There were no hereditary mental taints in any case. Four percent solution of cocain was instilled four times in each case. The manifestations were more usual at night. Urinary disturbances were eliminated.

In the discussion of Parker's paper²⁶ Jackson thinks that the cause of delirium is a mental disturbance due to senility and cites a case. Greenwood of Boston had two severe cases. He thinks it is mental shock in patients treated in a hospital. Wescott had one such fatal case, a man aged seventy-eight, in whom delirium began within twenty-four hours after operation. He quieted down but ten days later again broke out and jumped, injuring himself

fatally. Melville Black thought the essential thing in such cases is to give the patient mental rest, especially by suggestion. Zentmayer cited two cases to show that the condition is not always due to the patient's being operated away from home. Risley saw many cases. He is sure that being left in the dark is not always the cause, but has seen the delirium disappear after removal of the bandage from the unoperated eye. He gives his cataract patients a mixture of nux vomica, cinchona and gentian after operation and if old, gets them out of bed quickly.

Bruns²⁷ states that the postoperative dementia of cataract occurs only in the aged from confinement in the dark under lonely conditions, is more likely to occur when both eyes are bandaged, and his experience with ambulatory postoperative treatment of cataract confirms his views. Previously he had observed several cases of postoperative dementia in the hospital, and in two cases death resulted. Among 232 cases treated by the ambulatory method not a single instance of dementia occurred. These patients remained at home, visiting the hospital daily (under charge), for dressing, etc.

Golowsky²⁸ states that delirium was observed nineteen times in 2,430 operations. These were gathered from various reports of different statistical authors, and he rather incriminates the use of atropin.

The 9th Congress of Alienists and Neurologists as quoted by Truelle²⁹ adopted these opinions which he sustained: "The value of the element obscurity in the genesis of the delirium is superfluous. The only influence it may have is its painful moral impression, the fright it causes the patient. If this is sufficient to provoke a delirium it shows that the patient is singularly subject to emotion and thus predisposed. It would appear thus that delirium only occurs in those who have some hereditary predisposition to it."

Brownell³⁰ writes regarding the patients observed with delirium in the University of Michigan Clinic, which have already been reported by Parker,

and gives the following further particulars:

1. Delirium occurred in 3.1 per cent of the 962 cases operated upon.

2. The average age was 72 1/3 years, while the average age of those having senile cataract was between sixty and seventy years.

3. 33.6 per cent occurred in alcoholics.

4. In no case in the series did the urine indicate nephritis.

5. Hypnotics are the most effective drugs for controlling these patients.

6. The prognosis as regards the health or vision of the patient is usually not affected by the occurrence of delirium.

Despite the fact that kidney disturbance is said to be necessary in the development of postoperative delirium, there was no case in this series in which the records show albumin, casts, or sugar in the urine. In the discussion Brownell said that at least half of the patients when they came in were suspected of being potential cataract deliriums and showed a predisposition to it.

ETIOLOGY: The causes given in the literature for delirium following senile cataract operations are: bandage, loneliness, stomach trouble, run down condition and nervousness, circulation disturbances involving brains atrophied by senility, preoccupation before operation, regime to which the patient is submitted, fear of losing sight, alcohol and being deprived of it, atropin, senility, psychic, autointoxication, homesickness, mental shock, fright.

TREATMENT: Arlt⁶ recommends removal of bandage from the unoperated eye. Posey¹⁹, chloral and bromides. Frankl-Hochwart¹⁴ gives alcohol to alcoholics. Wood²⁴, bladder, pelvis, urine and blood should receive attention. Risley removes bandage from unoperated eye and gives a mixture of nux vomica, cinchona and gentian after operation and gets them out of bed quickly if old. Bruns²⁷ believes the ambulatory treatment prevents delirium.

AUTHOR'S RECENT CASES: The author has observed four cases of delirium fol-

lowing operations for senile cataract in 200 consecutive operations, and they were all grave. In two of them the vision was entirely lost, one retained 20/100 and the other 20/30. The one with 20/100 was operated upon for cataract in the fellow eye two years previous, with complete loss of sight; and the one retaining 20/30 was operated upon in the fellow eye ten years previous, with complete loss of sight. The history of this case is interesting and instructive:

E. E., age 64 years. General health good. Right eye operated June 1908 by a very competent operator. Sight lost. June 18th, 1918, left eye operated without complications. He was a model patient, did not make any complaint and the first inspection of the eyeball was made June 27th, or nine days after the operation. The corneal wound was closed, anterior chamber full, iris not prolapsed, the eye was quite free from postoperative inflammation and he could count fingers at five feet. Smoked glasses were prescribed for the day and a light bandage at night.

The next morning the bandage was removed, smoked glasses ordered during the day, and a light bandage applied at night. About 10:30 P. M., June 29th, or eleven days after the operation, he began talking loudly, attracting the attention of other patients in the ward as well as of the night nurse and house physician. He wanted to get up and while the nurse and house physician were trying to quiet him, he tore the frail cords from his wrists, which were put on and tied under the leg to keep him from interfering with the bandage while sleeping. As soon as his hands were free, he tore the bandage from his eye and was restrained with difficulty from getting up. He finally quieted down and the bandage was again applied, but in a short time he began to rave and was again restrained with difficulty.

Finally he seemed to wake up and when he recognized those around him and knew he was in the ward, he told the nurse he had been dreaming and was glad he woke up. He then went

to sleep and did not wake up until morning, when he related the dream and stated that he must have been insane. He said he thought he was at a spiritualistic meeting where he was blindfolded and bound in such a manner that he could not move and feared being killed. He said that with one heroic effort he broke the ropes that he was tied with and then tore the bandage from the eyes, and was going to jump out of the window when he woke up.

CONCLUSIONS: The reader is referred to Etiology in this paper and also to Kipp's report of twelve cases in 1903, where both eyes were bandaged in only one of the cases when the delirium began. Alcohol or the want of it can be eliminated in all four of the cases reported by the essayist; and atropin can also be eliminated because it was not indicated or instilled in any of them. The lenses were all removed in capsule, the eye lids were not opened for nine days, and they were all treated by the methods usually employed.

The author desires to emphasize the fact that great care should be exercised in getting the history of old people be-

fore operating for cataract. In all cases when possible, we should have one of their friends remain with them during their entire stay in the hospital, and to especially emphasize dreams to the attendant; and upon the slightest tendency to delirium, have their friends (who are their attendants) attempt to wake them up, and persist in it. The voice of a friend would naturally have more tendency to wake a patient who was dreaming than that of a stranger. The more the house physician and nurse talked to the author's reported case, and the more they tried to restrain him, the more delirious he became until he woke up.

If it appears necessary to have the operated eye bandaged, there is no reason why the bandage should not be reapplied after the patient wakes up, providing it was necessary to remove it to wake him up. Emphasizing dreams is not advocated to displace other methods of treatment, but there is a possibility that removal of the bandage, which is so generally recommended may be the chief factor in waking the patient from his dream.

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POSTDIPHTHERITIC OCULAR PARALYSES WITH REPORT OF THREE CASES.

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This is an analytical review of the literature relating to the subject which brings together the reported cases of each form of single or group paralysis. It is supplemented by three case reports and includes the bibliography of the subject.

Cases of postdiphtheritic paralyses of the eye muscles are reported now, as well as before the introduction of the diphtheria antitoxin into the therapy.

While the antitoxin has enormously reduced the death rate for diphtheria, it has not caused the paralyses to be diminished in proportion. Then while it attacks, under favorable conditions, the Klebs-Loeffler bacillus destroying its toxin, apparently it has no action and cannot prevent, in all cases, this late manifestation of the infection. The cause of this fact is not very clear. Osler¹ quotes Rollaston's study, which indicates that the early use of antitoxin diminishes the liability to paralyses. Forchheimer², in a discussion on this subject, states that, since the changes, which the diphtheria toxin produces in the peripheral nervous system, have been conclusively demonstrated by Roux and Yersin, either the theory of antitoxin is at fault or the antitoxin is not adequately used.

It is a fact that the serum is still empirically used against diphtheria. The exact amount of the toxin circulating in the blood of the patient is not known, and then it is not known how

many antitoxin units are to be injected in order to neutralize all the circulating toxin; and while the antitoxin, that is used for treating a case of diphtheria, may be sufficient to neutralize a great amount of the toxin, and to arrest the growth or attenuate the virulence of the bacilli, and to get the disappearance of the general and local symptoms, other toxin may remain in the blood, which is the cause of the paralysis.

It is known that, following an attack of diphtheria, the bacilli may persist in the throat or in the nose after all the membrane has disappeared. Moreover, still virulent bacilli were found by Spolverini³ in the smear taken from the region primarily affected in all his patients affected by postdiphtheritic paralyses. As the disease manifests itself, in the majority of cases, as a flaccid condition of the muscles, he also queries whether this sequel of diphtheria should be more properly called *myasthenia* instead of *paralysis*.

Statistics upon the appearance of paralysis in ocular muscles vary widely, going as high as to be present in 197 cases of the total of 494 cases of diph-

theria, Woodhead⁴, it occurs in 25 per cent of all cases of diphtheria according to some authors⁵, and in 7-8 per cent according to others⁶.

Ocular muscles can be affected separately or, more often, in association with paralyzes of the muscles of the palate, or of the pharynx, arms, legs, and others. These paralyzes, which are proportionately less frequent in children than in adults, can be a result of a severe attack of diphtheria as well as a mild one; the local lesion in fact, may be so trifling that the onset of the paralysis alone calls attention to the true nature of the trouble. It is stated that the paralysis of accommodation may occur in connection with these very light forms of the infection, while paralyzes of the exterior muscles are apt to follow severe cases.

The time that paralyzes of ocular muscles make their appearance is not constant; usually they manifest themselves during the convalescence of diphtheria, coming during the second, third, or fourth week of this period. In rare instances they occur in the height of the disease, or as late as eight weeks after the beginning of the infection.

From a review of the literature, it appears that the first to mention the organ of sight in connection with diphtheria is Faure⁷. In a description of a case observed by him coupled with a report of six others, Faure, in 1857, speaks of general paralytic symptoms, and among them, mentions "weakness of sight," and once "strabismus." Cases also are reported a year later by Richard and Meyer⁸ in which mention is made of "disturbance of vision." Donders⁹ then reports many cases that were "presented to him after diphtheria began to manifest, in the beginning of 1860, in several places of Netherland." He gives a right appreciation of the "weakness of sight" and "disturbance of vision," demonstrating that these ocular symptoms are not a result of a "disturbance of retina" as it was previously believed, but a result of paresis or paralysis of accommodation.

The literature then grows richer with the reports of other cases, which show that not only the accommodation and then the ciliary muscle, but also the sphincter of the pupil and all the exterior muscles can be affected, giving rise to the different varieties of ophthalmoplegias. This is true not only for the cases reported before but also for the cases that have appeared since the antitoxin has been widely employed.

CYCLOPLEGIA. The ciliary muscle, however, is of all the muscles the most frequently affected. Cycloplegia can be isolated, or associated with complete or incomplete paralysis of the sphincter of the pupil, or with paralysis or paresis of one or more of the exterior muscles supplied by the same third nerve, or by the fourth and the sixth. In the isolated or associated forms it can be monolateral or, more frequently bilateral, partial or complete, rarely persistent or permanent. T. Laennec¹⁰ in 1868 and after him Badal¹¹, Carreras Arrago¹², Tweedy¹³, Jessop¹⁴, Ottava¹⁵, Ruhemann¹⁶, Hutchinson¹⁷, Sym¹⁸, Schirmer¹⁹, Hochhaus²⁰, report cases of *complete unilateral* or *bilateral* cycloplegia. Mention is made of a similar case by Henderson²¹ in 1909, and by Espiño²² as recently as 1918. Of partial cycloplegia, cases are mentioned by Landmann²³, Castle²⁴, Bylsma²⁵, and recently by Pape²⁶. Park Lewis²⁷ reports a case of cycloplegia, which was cured by a second attack of diphtheria. A case of *persistent isolated paralysis* of accommodation is reported by Öloff²⁸, and a case of *permanent paresis* of accommodation by Müsham²⁹.

IRIDOPLEGIA. Benson³⁰ cites Abercrombie, who, in a paper on the subject, states that all the 18 cases of postdiphtheritic paralyzes, reported by him in the International Congress of 1881, had "mydriasis." Weber³¹ in a report of a series of cases of similar paralyzes, mentions also "mydriasis," and Paul Meyer³² states that his patient had pupils "uniformly dilated." In other cases, rare however, the paralysis of the sphincter is associated with paralysis of the ciliary muscle, or of the exterior muscles

TOTAL INTERIOR OPHTHALMOPLÉGIA. Donders³³ mentions a case of a girl 26 years old, who, five weeks after a severe inflammation of the throat, "applied to him, complaining of a disturbance of vision." On examination he found that the disturbance depended on a "diminution of the power of accommodation." The girl also had "pupils wider than usual, particularly the right one, reflex movement to light, tolerably good, and the accommodative movement, particularly in the right eye, very limited." He reports also a case of a boy aged 15, who had "paralysis of accommodation, large pupils, slight motion reflex, and scarcely perceptible accommodative movements."

Callan³⁴ mentions two cases of post-diphtheritic paralysis, one of which, a girl 11 years old, after an attack of diphtheria, showed "pupils slightly dilated and paralysis of accommodation." Risley³⁵ reports a case of "paralysis of iris and accommodation"; and Farnarier³⁶ a case of a woman 25 years old, who, "with paresis of accommodation also had paresis of the sphincter."

E. Wiegemann³⁷ mentions a case of monolateral and persistent paralysis of accommodation and permanent dilatation of the pupil. A boy had diphtheria three years before and, since that time, he had not been able to read. He had dilatation of the pupil of the right eye with preservation of the reaction to light and paralysis of accommodation of the same eye; a year later "the paralysis of accommodation disappeared but the right pupil remained more dilated than the left one." J. J. Pattee³⁸ reports a case of a woman 36 years old, who, among other general paralyses, had "paralysis of the intrinsic muscles of the eyes, "altho antitoxin had been used.

Stephenson³⁹ speaks of an unusual pupillary symptom associated with postdiphtheritic paresis of accommodation. He noted the symptom in a boy nine years old who, five weeks before, had been affected by "ulcerated throat." The boy had, beside other general paralyses, paresis of accommodation and normal reaction of the pupils to

light but "no near-vision pupillary reflex." He also mentions two of similar cases observed by Tooth and Lohmann. Tooth, who was the first to note the symptom, called it "accommodative iridoplegia." He found the symptom in an adult male patient who, a month before, had had an attack of faucial diphtheria, which had been treated with antitoxin. The patient, together with other general paralyses, showed "weakness of left orbicularis palpebrarum, paresis of the ciliary muscles, and normal response of the pupils to light but not to accommodation." Dr. Lohmann's case, a girl eight years old, about three weeks after an attack of diphtheria, showed "paresis of accommodation with the entire loss of near-vision pupillary reflex, together with retention of light reflex and the power of convergence."

Exterior muscles are also affected singly, or in association with paralyses of interior or other exterior muscles, forming different combinations, which can be classified as follows:

OCULOMOTOR PARALYSIS. (a) *Total oculomotor paralysis.* Donders also mentions a boy who, after an attack of angina, diphtherica, beside other general paralyses, showed "paralysis of the muscles of accommodation together with incomplete ptosis and divergent strabismus, all indicating a total paralysis of the oculomotor." Gowers⁴⁰ cites a case in which all the muscles supplied by one third nerve were paralyzed. Parkinson and Stephenson⁴¹ mention a case of a girl nine years old, who, beside general paralyses, showed partial bilateral ptosis; pupils large and equal, which reacted sluggishly to light and not at all to accommodation; and "paralysis of all exterior muscles except the external recti, and (possibly) the superior oblique." Teillias⁴² mentions two cases. A boy nine years old was affected by right hemiplegia and complete paralysis of the right third nerve. The left eye showed a paresis of the superior rectus. The other case, a boy seven years old, had bilateral incomplete ptosis, and complete paralysis of the same third nerve. The

left eye showed a paralysis of the superior and inferior recti.

(b) *Partial oculomotor paralysis.* Callan⁴³ also mentions a case of a boy 4½ years old, who, beside left hemiplegia, had incomplete bilateral ptosis with bilateral cycloplegia, and Rumpf⁴⁴ a case of paresis of accommodation and insufficiency of both internal recti. Scheby-Buch,⁴⁵ among 38 cases of paralysis of accommodation found two cases of insufficiency of internal recti, one of which also had paresis of the pupils. Farnarier⁴⁶ mentions another case of postdiphtheritic paralysis of accommodation in which there was a persistent paralysis of convergence.

PARALYSIS OF SUPERIOR OBLIQUE. The superior oblique is rarely affected. Isolated paralysis is reported by Graefe⁴⁷ and Kraus.⁴⁸

PARALYSIS OF THE EXTERNAL RECTUS. The external rectus is, among the exterior muscles, the most frequently affected. (a) *Isolated paralysis*, either monolateral or, more often, bilateral, partial or complete, is mentioned by A. Graefe,⁴⁹ Henoch,⁵⁰ Denig,⁵¹ Rother,⁵² Hochhaus,⁵³ Heintz,⁵⁴ Friedenwald,⁵⁵ Adams,⁵⁶ Begue,⁵⁷ Parkinson and Stephenson.⁵⁸ Terrien⁵⁹ reports a case of a boy five years old, who, six weeks after a diphtheritic angina, showed a paralysis of soft palate and paralysis of both external recti. Paralysis disappeared rapidly after an injection of 40 cc. of antidiphtheritic serum.

More frequently the paralysis of the external rectus is associated with paralysis or paresis of the interior, or also with paralysis or paresis of other exterior muscles.

(b) *Combined paralysis of the external rectus:* Marina⁶⁰ reports a case of paralysis of accommodation and of the right abducens; Dubois⁶¹ speaks of a case of bilateral paralysis of accommodation with monolateral paralysis of the abducens. Ziemssen⁶² makes mention of paresis of accommodation with bilateral abducens paralysis. Rosenmeyer⁶³ among ten cases of cycloplegia found two cases of paresis of both external recti; and Remack⁶⁴ among 100 cases of paralysis of accommodation found ten cases in which one or both

external recti were affected. Benson⁶⁵ records a case of a girl 11 years old, who, six weeks after a diphtheritic inflammation of the tonsils and pharynx, had paresis of accommodation which lasted seven weeks, double ptosis which lasted a week, and paresis of both external recti, which lasted about three weeks. Morton⁶⁶ reports three cases of cycloplegia with more or less complete paralysis of the external recti muscles, and in one case the superior and inferior recti were also paralyzed. De Schweinitz⁶⁷ found, on examination of a boy 4½ years old, three weeks after an attack of diphtheria, ptosis and weakness of the right and left external recti muscles, irregularity of pupils (right larger than the left), and paralysis of the ciliary muscles. Février⁶⁸ reports a case of incomplete paralysis of accommodation and of the two external recti muscles together with paralysis of the orbicularis of the right eyelids. Moll,⁶⁹ in 150 cases of postdiphtheritic paralysis of accommodation, found four cases of iridoplegia, one case of ptosis, sixteen cases of bilateral paresis of the external recti muscles.

TOTAL EXTERIOR OPHTHALMOPLÉGIA and TOTAL OPHTHALMOPLÉGIA. Cases in which almost all of the exterior muscles and almost all (interior and exterior) muscles of both eyes were affected are reported by Mendel,⁷⁰ who, in a boy, five weeks after a mild attack of diphtheria, found double ptosis, multiple paresis of the muscles of the right eye and paresis of all the recti muscles of the left eye. Ewetzky⁷¹ mentions a case of a girl, who, two weeks after a sore throat, showed dilated pupils, bilateral ptosis, abolition of upward and downward movements of both eyes, and limited lateral movements. Uhthoff⁷² mentions two cases in which almost all the muscles of both eyes became paralyzed. In one case there was double ptosis and double cycloplegia. The right eye was motionless, and in the left eye the only action was in the external rectus. Marina⁷³ mentions a case of paresis of both internal recti, of both external recti, and of the right superior rectus

and superior oblique. Goodall⁷⁴ among 1071 cases of postdiphtheritic paralysis, reports, beside 56 cases of paralysis of accommodation, 7 cases of monolateral and 3 cases of bilateral paralysis of external recti, also two cases in which the most part of the ocular muscles were affected. Remack⁷⁵ also mentions a case of bilateral paralysis of the oculomotor and abducens.

Cases of *permanent* paralysis of exterior muscles are reported by Duane and Morvat. Duane,⁷⁶ in a girl of six years old, found, four years after an attack of diphtheria, "paresis of both externi with secondary deviation of the interni"; and Morvat,⁷⁷ in a patient, two years after an attack of diphtheria, found a paralysis of left internal and left inferior recti, and paresis of left superior rectus and paralysis of right inferior rectus. Four years later he still showed paralysis of both inferior recti.

In some epidemics, it has been noted, paralyses appear and disappear suddenly, one muscle being attacked after another (Pagenstecher,⁷⁸ Gowers,⁷⁹).

Postdiphtheritic paralysis has been considered as a toxic neuritis due to toxin circulating in the blood. Landammann, who is mentioned above, thinks that, in the majority of cases of cycloplegia, the paralysis is due to a perverted state of the blood influencing the nutrition of muscles and not the nerve or the nerve ending. Sym thinks that it is due to poisoning of the nerve just as in paralysis caused by sausage or fish poisoning. The pathology of diphtheritic paralysis, however, is very much in doubt. It has been ascribed either to capillary hemorrhage in the nerve nuclei, or disease of blood vessels supplying the nuclei or the nerves, basal or orbital neuritis and inflammatory changes in the muscles themselves.

Weisenburg, on discussing the different findings reached by the anatomic pathologic research of Mendel and P. Meyer, who found changes in the bulbar nuclei with a degenerative neuritis of the cranial nerves; of Hochhaus, who, in an instance, noted that the alterations were limited to the

muscles; of other authors, who found that the changes are confined, in the majority of cases, to a degeneration of peripheral nerves, states that, from pathology, we can not come to a definite conclusion whether the cause of this palsy is central, peripheral or both.

REPORTS OF CASES.

To the above reported cases I would like to add the following, which came under my examination in the clinic of Dr. Bailey, by whose kind permission I publish them. The first one is a case of bilateral isolated paresis of accommodation, the second and the third are cases of isolated paresis of the right external rectus. In these cases the paresis manifested itself from four to seven weeks after the appearance of the primary disease. With the view of determining whether the usual treatment is of any avail either to shorten the duration or in regard to the final result of the paralysis, no treatment was advised. The paralysis lasted from four to six weeks, it passed away entirely and at present time the condition of the eye muscles is entirely normal.

CASE 1. Mrs. A. J., a married housewife, 36 years old, came to the clinic on May 14th, stating that for two days she had not been able to see well while doing any near work. Nothing special in her previous history, no chronic disease or miscarriage.

On April 2nd she had contracted diphtheria of the tonsils; had had an injection of 5000 a. u. the day after; recovered five days later. Culture had been taken from the throat by the attending physician and found positive for diphtheria.

Both eyes were externally normal, pupils 3 mm. in diameter, reacted promptly to light and consensually, sluggishly to accommodation and convergence.

Vision R. 20/20. L. 20/20. Fields of vision normal for form and color; media clear, fundus negative.

On testing the near point I found that she could read, holding the test type at a distance of 18-20 cm., the type 0,50

only with the help of a lens +3.50 in front of each eye.

Paresis was stationary for two weeks. Subsequent examination showed that it gradually improved and on June 11th, she could read type 0.50 at 18 cm. without the help of any lens.

The paresis started about six weeks after the beginning of the primary disease and lasted about four weeks.

CASE 2. A. J., a daughter of Mrs. A. J., 4 years old, was brought to the clinic on May 26th by her mother, who stated that for three days the girl's right eye was turned in. On talking her voice has a distinct nasal phonation. No past disease. The girl had contracted diphtheria on March 30th. Culture had been taken from the throat and found positive for diphtheria. One injection of 5000 a. u. had been made, and the girl had recovered from infection in six days.

R. E. was turned in; and, on lateral movements to the right, it could not go beyond the median line. Movements in any other direction were normal. Excursion of L. E. normal. Secondary deviation greater than primary. Pupils reacted to all tests. No general paralyses were present.

July 2nd. Primary position of both eyes normal; excursion of right eye normal in all directions.

Paresis started about seven weeks from the beginning of infection and lasted about five weeks.

CASE 3. M. W., 8 years old, came in on February 26, 1919. The mother states that for about three weeks the girl had been complaining of diplopia, and her right eye had been crossed. The girl had been affected with diphtheria of the tonsils on January 1, 1919.

Culture had been taken and found positive for diphtheria, and antitoxin had been administered.

Eyes examination showed that R. E. was turned in, and on lateral movements to right it could not pass the median line. Movements in every other direction were normal. Movements of left eye normal. Secondary deviation greater than primary. Pupils reacted to all tests. Vision and fields of vision normal; accommodation normal. No general paralytic symptoms were present.

March 17th. Primary position normal, and all movements of right eye were normal.

Paresis began about five weeks after the beginning of diphtheria and lasted about six weeks.

As in previous cases no treatment was advised.

REMARKS. These three cases and many others reported in the literature show that the paralysis of the eye muscles can be a sequel of diphtheria irrespective of the use of antitoxin and the age of the patient.

Diphtheria can paralyze the eye muscles without producing paralyses of muscles of other organs.

Postdiphtheritic paralyses of eye muscles pass away spontaneously.

Treatment has no influence on the course of these paralyses. In my cases paralysis lasted from four to six weeks. This is the usual duration of postdiphtheritic paralysis, as far as we know from the cases reported in the literature.

The eye muscles, in postdiphtheritic paralysis, usually regain their function entirely.

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NOTES, CASES AND INSTRUMENTS

A PRISM METER-MEASURE, FOR USE IN RETINOSCOPY.

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In order to provide an accurate and practical means for measuring the distance between subject and examiner a simple device is herewith presented.

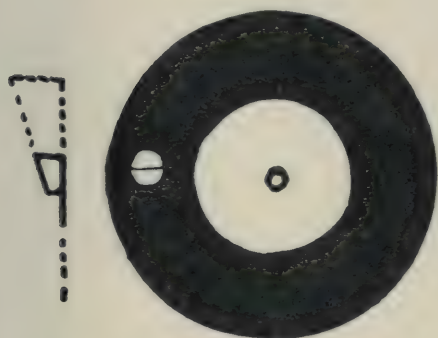


Fig. 1—Prism mounted in rim of retinoscope with edge at middle of aperture. Front view and enlarged section.

A prism of one prism diopter strength is mounted behind a 5 mm. aperture so that its edge bisects the opening. If this is held before the eye a prismometric scale will show a deviation. When the scale is exactly one meter distant, the displacement will be one centimeter. At a greater or less distance the displacement will be greater or less respectively, and in proportion. A simplified scale is suggested—a horizontal line upon which are erected two perpendiculars two centimeters apart, another line is dropped from the horizontal at a point midway between the two uprights. This scale may be placed on the trial-frame, on a blinder, on the retinoscopic rods, the subject's head, etc.

When the prism is held with its edge in the perpendicular meridian of the pupillary area (and in the position of minimum deviation) all the lines are of equal intensity and the long horizontal

line is single. A cross will be formed as soon as the desired distance is found. With a carefully selected prism the device is surprisingly accurate—a desirable point, particularly when working at distances of less than a meter. With the prism mounted in the rim of the retinoscope the range may be instantly found without removing



Fig 2—Scale to be placed on trial frame or patient's head. When doubled by prism the single cross marks exactly corresponding to one of the two cross marks on the other side gives the distance at one meter.

the instrument from the eye, and the scale—best, white, on a black ground,—is illuminated by the mirror.

ADVANCEMENT BY MEANS OF A SILVER SCREW CLAMP.

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CHICAGO, ILL.

During the past three years I have done over twenty-five advancements by using a screw-clamp for the purpose of tucking the muscle in cases of strabismus, with perfect results.

This clamp is made of silver and is closed by two screws such as are used in holding the lenses of rimless eyeglasses, placed 7 mm. apart. The clamp remains fixed in situ until it is freed and expelled from the conjunctival sac.

Method of application:

A partial or complete tenotomy of the opposing muscle is first done. The

conjunctiva over this is then sutured.

After the muscle to be advanced is located under a free conjunctival opening, it is exposed and freed for a length of about half an inch, by means of two tenotomy hooks, one held in each hand.

The scleral area just back of the muscle attachment is next curetted with a sharp chalazion spoon. This no doubt aids in obtaining an early and firm reattachment of the muscle.

A heavy black thread is carried under the muscle by means of a blunt curved needle.

Both ends of this thread are now passed thru the clamp and the latter is allowed to drop over the muscle.

The assistant draws the muscle thru the clamp by means of this thread, one end being held in each hand, while the operator presses the clamp over the muscle, pushes it down, closes it and holds the clamp firmly with an ordinary broad tipped tissue forceps. The latter is modified in so far that it has a shoulder on the inside of each lip. While the clamp is held with the left hand the two screws are firmly set with a small screw driver.

It is very important that both screws enter easily. Conjunctival or other tissue should not be allowed to become entangled and carried with the threads of the screws. This would cause the latter to bind before the muscle is well clamped. If this should occur the clamp must be taken off and the screws thoroly cleansed of all tissue before its reapplication. The amount of muscle advancement may be instantly increased by loosening the screws somewhat, the assistant then draws the muscle further thru the clamp, while the operator presses it down with the forceps and again sets the screws.

The black "lifting" thread is cut off, leaving a short piece under the projecting muscle.

If thought advisable the conjunctiva may now be sutured just in front of the clamp, the threads reversed and their ends carried around the back of the clamp and there tied.

The reaction is less than in suture operations.

Both eyes are bandaged for four days.

The eye is dressed after two and four days, then daily and kept bandaged for a few days after the clamp has come off.

The latter is expelled from the conjunctival sac in from seven to fourteen days.

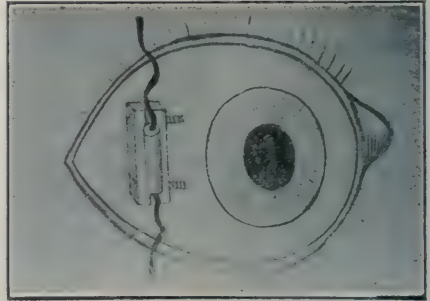


Fig. 1—Silver clamp for advancement of recti muscles showing clamp applied to fold of tendon. Thread by which tendon is drawn into clamp remaining in fold.

Fresh argyrol, silvol, or a similar solution is instilled at each dressing.

The clamp causes no inconvenience or pain.

The method of application is extremely simple.

The same clamp may be used repeatedly.

HERPES ZOSTER OPHTHALMICUS.

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The arrangement and appearance of the scars left by ophthalmic herpes is so characteristic that the diagnosis is often made from them years after the occurrence of the attack. But we find very few good illustrations of the lesions in the literature related to it. The following cases seen at the height of the attack presented such typical appearances that the photographic record of them then obtained seems worthy of publication.

CASE 1. O'N., J. J., Pvt., aged 30, Jan. 8, 1919. Three days ago he had slight facial neuralgia, and then herpetic vesicles over the superior branch of the left fifth nerve. Many abscessed



Fig. 1.



Fig. 2.

teeth with pyorrhea and follicular depressed tonsils. His teeth were treated and some removed. Tonsils were treated. In two weeks he was practically well, with little scar formation. Regarded as a self limited disease of six weeks to three months' duration, from focal infection causing a neuritis of the sphenopalatine ganglion.

CASE 2. L., D. D., 2nd Lt., aged 29, Dec. 25, 1918. Six days ago he had neuralgia of the fifth nerve, then erup-

tion over the superior and middle branches. Two weeks later affecting the conjunctiva with a vesicle thereon. There was secondary iritis not yielding to atropin. Regarded as a self limited disease of six weeks to three months, from focal infection causing a neuritis of the sphenopalatine ganglion. In this case cause seemed to be of intestinal origin. The case went six weeks with a resultant scarring of the face and posterior synechia of the left iris.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

MARCH 18, 1920

DR. G. ORAM RING, Chairman

Treatment of Congenital Cataract.

DR. P. N. K. SCHWENK applied his remarks to lamellar cataract, it being the most common form in children. In all cases where the pupillary area is covered, he favors early operative interference in order to maintain the retinal function, and cited cases where delayed operations caused amblyopia due to failure of early retinal stimulation. The operation is that of curettement of the lens, removing as much of cortical as possible thru a small opening into the upper part of the cornea by means of a broad needle. Under general anesthesia and a widely dilated pupil he enters his broad needle in the upper part of the cornea just in front of the iris so as not to have the iris engage in the opening, passing needle deep into the lens, making two lateral movements with needle, so as to make a large opening into the lens, withdrawing needle with gentle backward pressure to invite cortical to engage into the wound over needle, then with iris forceps grasp the anterior lip or flap of capsule and withdraw it. If the capsule is shriveled, or too tough to

rupture with the needle, grasp the capsule with iris forceps and by gentle traction remove capsule with lens contents, dress the eye, apply bandage, which is retained for three days when the eye can be left unbandaged.

Dr. Schwenk stated that discission was nothing more than an intended traumatic cataract and the treatment of traumatic cataract is curettement of lens and therefore it is logically the safest treatment for congenital cataracts. The radical operation is not attended by any greater risk—not as much—than that of discission. Later on repeated operations are rendered unnecessary and add much to the pleasure and physical development of the patient. Dr. Schwenk cited that he operated on his first case at eleven months, removing a shriveled lens capsule in its entirety, and three months later repeated the operation on the other eye.

DISCUSSION.—Burton Chance stated it had been his privilege to assist Dr. Schwenk in a number of his early cases, and besides witnessing the operations in others, he has examined several of the earlier cases in recent months. Except in the instances cited by Dr. Schwenk, there had been uniform freedom from entanglements of iris and capsule in the cicatrices. In spite of the points so pertinently brought out in the discussion, he believes that from the results obtained

Dr. Schwenk has been justified in his procedure.

In Dr. Chance's opinion, in considering cataract in the young, when so dense as to render the child blind, the surgeon should operate early before the child's mental and physical natures are set, for, even tho light perception only is gained the child's development will be benefited by the removal of the opaque lens.

Dr. Posey said that he could not agree as to the desirability of operating as early as possible in congenital cataract, for in his judgment the age at which the operation should be undertaken depends largely upon the extent of the opacification of the lens and the degree of vision, for while he considers it desirable to remove the opacity as early as possible in eyes that are blind or in which the vision is very much reduced, on account of the danger of the mental development of the child being retarded from lack of sight, he makes it an invariable rule not to operate until the child is ten months old, for at an earlier age the structures comprising the anterior segment of the eye are so small and so little developed, that it is scarcely practicable to perform the necessary instrumentation. Moreover, it has been asserted that the amount of aqueous humor in a younger child is insufficient to procure the solution of the liberated lens substance. Dr. Posey, however, insists that operation should not be deferred later than ten months in such cases, for, while it is true that the mentality of many infants with congenital cataracts is permanently deficient and the lenticular opacities coexist with other stigmata of degeneration, he has seen improvement of vision stimulate the mentality in too many cases not to consider its betterment in all instances at as early an age as possible.

In all cases, however, in which the opacification is not complete and vision is fairly good, it is well to postpone operating until even three or four years have been attained, for the longer the surgeon waits the more the eye develops and the more apparent does the exact nature of the lenticular opacity become, and the dressing and bandaging of the eye

is easier and there is less danger of infection.

He does not believe the functions of the retina are at all interfered with by delaying the operation. He thought Dr. Schwenk's procedure more dangerous than simple discission, on account of the liability of entanglement of the iris.

Dr. Zentmayer said, while he believed in early operating in congenital cataract he did not think we need be deterred from waiting until the child has grown for fear of loss of function of the retina, as there is no analogy here to amblyopia ex anopsia. Cases are on record where excellent vision was secured after the absorption of congenital cataracts as late in life as the twenty-fifth year. He believed the needling operation for congenital cataract, where there is no evidence of undue thickening of the capsule, by far the safest operation. A single needling is often sufficient if the surgeon and patient are willing to wait and let Nature act. Usually, however, more than one operation is required. When the needle is entered thru the sclera the danger of infection is negligible. It is difficult to avoid an anterior synechia in the linear method. Recently there was exhibited before a local society three children who had been operated upon by a modified linear extraction and in two there was anterior synechia. In a case recently operated upon the diagnosis of thickened capsule was confirmed at the operation for on attempting to withdraw the knife-needle the lens was brought into the anterior chamber where it was successfully removed by the Ewing method. This consists in passing a broad keratome behind the lens so that the pupillary area is shut off and in delivering the lens along the blade of the keratome.

In discussing Dr. Schwenk's paper, Dr. Risley said that he knew of no other group of cases requiring surgical interference in ophthalmology that required more individual judgment and ingenuity in their management than congenital cataract. In the first place they occurred quite habitually in children who are otherwise abnormal; the lens disease being only one manifestation of the disorders of the tissues developed from the

ectoderm and mesoderm thruout the body. There were usually intestinal disorders leading to a general toxemia, glandular enlargements, and choroidal disease which was the immediate cause of the lens opacity.

He thought it was better to treat these general disorders, and to avoid all operative interference upon the eyes until the child was five to ten years of age. He had often found a preliminary iridectomy a wise procedure, after which the general health of the eye seemed to improve. He was often controlled by the peculiarities of the individual case as to what subsequent operative procedure should be undertaken. He thought in the majority of cases that discission operations were desirable, and where the capsule appeared tough, and proved to be resisting to a single knife needle, he had a second one at hand and inserted it from the opposite side of the cornea to that first pierced and made the one knife a point of resistance for the other, their points being separated in the lens, the two moving in opposite directions. By this method he had often succeeded in tearing or cutting the capsule and incising the opaque portions of the lens and in securing an open pupil, where he had failed with but one Hay's knife.

Dr. G. Oram Ring referred to a method he had learned from Dr. Risley and had used with great satisfaction, namely, with pupil dilated *ad maximum*, the Hays-Ziegler knife was used to incise capsule and lens, in a vertical direction, the incision beginning just below the upper dilated pupillary border and extending downward to a position just above the lower border.

While the incision was carried deeply into the lens, it did not penetrate the posterior capsule, as did Dr. Ziegler in his V-shaped method.

Dr. S. Lewis Ziegler thought personal opinions could reasonably differ according to each one's experience. He would operate on congenital cataract at any age, early or late, depending on the indications. He did not think that delay would destroy visual function, but it might cause mental hebetude or loss of muscular coordination. He had seen congenital cases operated on at thirty, forty

and sixty years of age retain full visual acuity. There might be loss of proportion or the sense of distance, but this could occur at any age and was soon overcome by training.

Curettement of the lens, paracentesis and linear extraction were practically identical procedures. The possible complications of this procedure are iris prolapse, entangled capsule, rapid swelling of cortex, wound infection, corneal astigmatism and anterior synechiæ.

For some years he had been practising thru-and-thru division of the lens by his V-shaped incision. The pressure of swollen cortical was fore and aft and the ciliary body did not become inflamed by swelling in the angle. The cortex dissolved rapidly and only a single operation was required. He had recently operated on a child, aged three years, and another of eight, both of whom he would try to show at the next meeting.

The late Dr. Strawbridge often resorted to paracentesis. He did this operation on the father of the three-year-old child previously referred to, but a prolapse of the iris necessitated iridectomy, and posterior synechiæ followed. By the older methods of discission it is often necessary to resort to paracentesis because of rapid swelling of the cortex. We should therefore welcome any new technic that will help us to escape this complication.

Dr. Holloway stated that he thought the treatment of these cases depended upon the type and character of the cataract encountered. While it may be advisable to defer very early operation in the zonular cases, he believed that total congenital cataract should be subjected to earlier operative procedures. He has just dismissed from the hospital a case of this character in a twenty-two-months-old infant. Each cataract in this case was hypermature. A successful result was obtained. Another infant fourteen months of age was now in the hospital and one eye had been successfully operated on. In regard to Dr. Risley's statement concerning iridectomy, he stated that in certain cases with small zonular opac-

ities Critchett did an optical iridectomy as had been practised by his father. He believed that in certain of these zonular cases, especially with moderate degrees of vision, the lens should not be touched.

Facial Palsy, with Ectropion of Lower Lid.

DR. WM. C. POSEY exhibited a young man who had developed the above condition as a result of disease of the superior maxillary bone in early childhood. The cosmetic deformity was considerable, but the chief cause of complaint was excessive lacrimation from the malposition of the lower lid. To correct this a thoro division of a series of cicatricial bands, which bound down the margin of the lid to the lower orbital rim, was done subcutaneously. Three sutures were then passed thru the ciliary border of the lid and the lid pulled as far upward as possible over the upper lid and secured in this elevated position by anchoring the sutures in the tissues just below the brow. To raise the inner canthus and to restore the functions of the lacrimal apparatus by bringing the punctum into apposition with the globe a flap was cut from the root of the nose, after the method of Hassner, and sewed into the tissues just subjacent to the lower lid margin, being superimposed upon an area which had been previously denuded of skin for its reception, the flap being so shaped and devised that it exerted an upward and inward traction upon the lid in the cicatrizing process. The sutures which dragged the lower lid upward were removed at the end of ten days. Cosmetically the results of this double procedure were very fair. Lacrimation, however, persisted, and the palpebral portion of the lacrimal gland was removed, without, however, exercising any marked improvement on the tearing. The removal of the entire gland was therefore decided upon and was accomplished without accident.

Presentation of Original Hays Knife-Needle.

DR. WM. CAMPBELL POSEY presented to the college a Hays knife-needle

which had been the property of its designer, the late Dr. Isaac Hays, and used by him years ago. The instrument had passed into the possession of his son, Dr. I. Minis Hays, who had given it to Dr. Posey. A description of the instrument as published by Hays in 1855 is as follows:

"This instrument from the point to the head, near the handle, is six-tenths of an inch; its cutting edge is nearly four-tenths of an inch. The back is straight to near the point, where it is truncated so as to make the point stronger, but at the same time leaving it very acute, and the edge of this truncated portion of the back is made to cut. The remainder of the back is simply rounded off. The cutting edge is perfectly straight and is made to cut up to the part where the instrument becomes round. This portion requires to be carefully constructed, so that as the instrument enters the eye it shall fill up the incision and thus prevent the escape of the aqueous humor."

Dr. Posey referred to a paper by S. Lewis Ziegler, on the "History of Iridectomy," which contained a description of all the instruments which have been devised at various times for incision of the iris, and said that the knife-needle designed by Ziegler is a modification of the pattern devised by Hays. Dr. Posey said that he preferred the Hays knife, or Ziegler's modification of it, to another form of knife-needle.

Dr. Hays, who was born in Philadelphia in 1796 and died in the same city in 1879, was one of the foremost as well as one of the earliest ophthalmologists of America. He graduated in medicine at the University of Pennsylvania in 1820 and soon after devoted himself to ophthalmic practice. In 1822 he was appointed a surgeon to the Pennsylvania Infirmary for Diseases of the Eye and Ear, and a similar distinction was conferred upon him on the organization of the Wills Eye Hospital in 1834. He served the latter institution for twenty years. In addition to being the designer of the Hays knife, Dr. Hays successfully edited three American editions of Lawrence's *Oph-*

thalmic Surgery, in the last of which, published in 1854, Dr. Hays recorded the first case of astigmatism reported in America. In addition to his ophthalmologic pursuits, Dr. Hays was much interested in natural history, but he is perhaps best known to posterity by his long tenure in the editorship of the *American Journal of the Medical Sciences*. He was for many years a Fellow of this College and greatly interested in its welfare.

DISCUSSION.—Burton Chance wished to express his thanks to Dr. Posey for the donation of the Hays knife, and he trusted that it will be preserved in the about-to-be-formed "historical museum" of the Section. Ever since his undergraduate days Chance has been interested in the Hays knife, for it was one of the instruments recommended by Dr. Ashhurst, and was figured in his text-book of *Surgery*, in the chapter on Diseases of the Eye, which students had to study in their preparation for graduation, as at that time ophthalmology was subject to general surgery in the curriculum of the University.

He called the attention of the Fellows to the fact that Hays devised his knife for the treatment of mature senile cataract. At the period of its invention, 1850, the procedures for the extraction of the entire lens were regarded as dangerous and were to be resorted to only under the greatest necessity. The knife would be used, therefore, repeatedly for the solution of the solid lens. Many and varied were the needles used for the purpose, besides those suitable for reclinaton, but none were so simple as that devised by Hays. Having seen the instrument used, with such beneficial effects, for other purposes in the hands of so many of his teachers and friends, he said that he was astonished to find, in 1911, that it had only recently been introduced, in the form of the so-called Ziegler modification, in a certain hospital in England, the ophthalmic wards of which were then in charge of distinguished ophthalmologists. He could then understand why capsular after-cataracts were so rarely discinded by his English confrères, whose arma-

mentarium contained, however, ground-down von Graefe's cataract knives. With the image of this simple knife-needle before him he wondered how it was found possible to manipulate a blade which was in effect a lengthy triangular lance.

The specimen shown tonight, Chance noticed, had been made in France. Now, Hays lamented that his first knives were unsatisfactory. Those entrusted to a famous London instrument maker were impossible, and those developed by a French cutler were but little better. But Kolbe, of Philadelphia, formerly an employe of Luer, was able to fashion one so exactly as to receive Hays' praise. This may not be uninteresting to those who are mindful of Philadelphia's position in the medical world.

It is perhaps not out of place here to speak of the knife which Dr. Ziegler modestly claims to be a modification of the Hays' knife. A comparison between the specimen exhibited tonight and Dr. Ziegler's latest pattern will show that they are not at all similar, and in Chance's opinion the Ziegler knife-needle is a distinctly separate device.

Temporary Obstruction of Central Retinal Artery.

DR. GEO. H. CROSS reported the case of E. P., aged forty-eight years, white (English), patternmaker. Past medical history, rheumatic fever twenty-five years ago. Present illness, last July was ill during the night with a severe headache, on the next day he could not talk well; he worked at his trade for a while, when his right hand became weak and he had to give up work. He lost the power of movement in the right side of the face and arm, with motor difficulty in speech; complained of failing vision in left eye. Laboratory examination: Wassermann, negative; urine, negative; blood-pressure: systolic, 138; diastolic, 98.

Examination December 10, 1919: Left eye—vision could not be recorded, due to mental condition; pupil reacts promptly to light and convergence; media clear; disc round; margins fairly sharp; central physiologic de-

pression; lamina well seen; margins of physiologic depression encircled by small artery on the rim; disc congested, blood vessels full, swollen and tortuous. At the moment of observation there was a sudden break in the descending temporal artery, this break resembling in appearance the separation often seen in the mercury column of a thermometer. When first observed this blanching of the artery was noticed on the disc and slowly moved over the edge, increasing until it was about a disc diameter in length; there was a pause, when suddenly the empty area moved forward, the vessel walls being completely filled, and pushing this area forward. Being accurately focussed on this vessel during the entire time the phenomenon lasted, the very interesting fact was noted that when the vessel was empty of blood there was no apparent change in its caliber; it remained like an empty cylinder, with no tendency of the walls to collapse or be dented. The forward progression of this area was slow and uninterrupted until a bifurcation in the vessel was reached, where it divided, with part going to each branch, the following blood column in each branch was unbroken and gradually pushed the empty areas toward the periphery, where they disappeared; in no other vessel was this phenomenon observed; there were no hemorrhages or other lesions in the fundus. This eye has been examined many times since, but only once was this interesting condition observed.

About January 1 more marked signs of cerebral disturbance were observed. These attacks increased so that on February 18 of this year, after several attempts at violence to members of his family he was committed to the State Asylum for the insane, after an examination by a board of physicians.

DISCUSSION. Dr. Schwenk asked Dr. Cross if the empty vessel could be seen? He cited a case where he had made a picture for Dr. Geo. C. Harlan, who reported a case in 1887 at the American Ophthalmological Society, where the retinal vessels were empty and invisible, showing that the presence of the blood in the vessel is nec-

essary in order that the bloodvessel can be seen.

Dr. Hollaway stated that he had always been very much interested in changes of this character and had been fortunate enough to see an unusual series of these cases, some of which had been placed on record by Dr. de Schweinitz and himself. He had also seen one of the cases reported by Harbridge. He then exhibited drawings of two eyes, in one of which an anastomotic vessel had formed after the occlusion of an arterial branch. He referred to the interesting obscurations of vision that sometimes preceded occlusion of the vessel and referred to a patient, now under observation, where these attacks had been occurring about every ten days for many months. Despite the objections of certain observers he felt that spasm of the vessel could not be excluded. After alluding to certain conditions such as Raynaud's disease, he referred to the observations on Trench Foot by Sweet, Norris and Wilmer. They believe this condition to be dependent upon an incomplete spasm of the arterioles in the foot which results in localized increased blood pressure. In the absence of thyroid extract they used potassium iodid in the treatment of fifty-three cases, with the most gratifying results. The patient with long-continued attacks of temporary obscurations of vision had been given thyroid extract for a considerable period of time, but with negative results.

Acute Amblyopia from Wood Alcohol.

DR. ERNEST B. MONGEL (by invitation) reported a case of acute amblyopia due to methyl alcohol. The patient, a male, aged twenty-one years but recently discharged from military service, had only occasionally indulged in alcoholic drinks. On Christmas Eve, 1919, he took three drinks of supposed whisky and on the following day three more. He recalled a foul ether-like odor and taste.

Within thirty-six hours he awoke without light perception or projection. Patient seen twelve hours later. Pupils were equal, round, moderately dil-

ated and faintly responsive to light; tension normal; conjunctiva deeply injected and marked distention of anterior scleral veins. Media of both eyes were clear. The ophthalmoscopic picture was that of a severe and widespread toxic neuroretinitis. The edematous cloud extended well outward from the nerve into the adjacent retina. Veins were very dark, engorged and tortuous.

Differential diagnosis included diseases of orbit, accessory sinuses of the nose, of brain, of metabolic disturbance, of various systemic poisons, and of the infectious diseases. Blood examination showed only slight lymphocytosis. Wassermann and von Pirquet were negative. Sinuses were negative and urine showed only a trace of albumin, with a few hyalin casts.

Patient was admitted to the Episcopal Hospital. Treatment was as follows: Absolute rest in bed, gastric lavage; liquid diet; elimination by salines thru bowels. Pilocarpin, gr. $\frac{1}{2}$ hypodermically, and hot-packs daily. Supportive treatment, with strychnin, gr. 1-30, t. i. d. Alkaline therapy, calcium chlorid, grs. x (four times daily). After two days' treatment he recognized fellow-patients, and upon discharge at the end of six days vision was 20/50. From this time there was a progressive improvement in all symptoms, until on March 2, corrected vision was in each eye 20/30.

Reference was made to the methods of manufacture of methyl and ethyl alcohol—and emphasis placed upon the slow elimination of the end product of oxidation. Formic acid, which is a normal urine constituent, is excreted in much greater quantities after ingestion of wood alcohol. The following conclusions were drawn:

1. That methyl alcohol is a violent and deleterious poison, producing in the optic nerve and retina the same functional disability or destruction which characterizes the intake of other toxic substances.

2. That since it is slowly eliminated from the body, and an end product of oxidation, as formic acid, also a poison, instead of the rapid and more or less

complete oxidation with acetic acid as an end product, it is much more dangerous in the general circulation than the ethyl alcohol as causative factors in amblyopias.

3. That its specificity of toxic action on the optic nerve is manifested clinically as two distinct types: (a) Neuroretinitis; example, case reported. (b) Retrobulbar neuritis, with its sector atrophy involving the papillomacular bundle of fibers.

4. That the acute amblyopia is probably an interstitial inflammation of the optic nerve associated with intense edema and serous infiltration, nature trying to neutralize and dilute the poison. As an analogy Dr. Mongel offered the example of poisoning with poison nettles or bee sting, also due to formic acid and followed with edema and swelling. The latter types seem to be the hopeful ones from a prognostic standpoint. By proper treatment, promptly administered, the pressure is removed from the nerve fibers and thereby saves them from atrophy.

5. That those cases in which the pressure is allowed to persist or in which the toxic action is specifically on the ganglion cells of the retina and the fibers of the nerve, are represented clinically by an absolute central scotoma and an atrophic temporal half of the nerve. These are hopelessly blind, as medical treatment has been of no avail in such cases.

DISCUSSION. Dr. S. Lewis Ziegler commended Dr. Mongel's use of calcium carbonat to relieve the acidosis, altho sodium bicarbonat in larger doses, well diluted, might have yielded more prompt results. Wood alcohol oxidizes first to formaldehyd, which is corrosive, and next to formic acid which is more corrosive. The latter, if passed in the urine, will reduce Fehling's solution just like sugar, and might lead one to a false diagnosis of diabetes.

The three methods of poisoning are by ingestion, inhalation and absorption thru the skin. Tainted toilet preparations are most dangerous, but the "antifreeze" mixtures used in motor engines are a close second.

Dr. Robinson, city chemist, has given us a new test that is sensitive when as little as 1-100 of 1 per cent of wood alcohol is present. He renders the solution alkaline, oxidizes by potassium permanganate, adds equal parts of milk, hydrochloric acid and water and gets a permanent pink color if any methylic alcohol is present.

Altho grain alcohol can be produced cheaper than wood alcohol it costs more because of the tax. Denatured alcohol is the cheapest but contains disagreeable compounds. Hence the resort to wood alcohol. Dr. Edward Martin, State Commissioner of Health, should be commended for holding down the profiteers by requiring affidavits from every manufacturer and jobber in Pennsylvania that his preparations are made from grain alcohol and not from wood alcohol. The treatment should include alkalies, lavage, enemas, pilocarpin and strychnin. If the retina and optic nerve fibers are not too seriously injured negative galvanism may restore their function.

Dr. Holloway thought Dr. Mongel would be interested in the observations of Fridenberg, who believes that the blindness in these cases results from formaldehyde or formic acid in the circulation. In a patient observed by Gifford, blindness was also attributed to formaldehyde, but in this instance supposed to be generated by burning methyl alcohol. It was also pointed out that under present conditions the type of individual coming under observation was apt to be entirely different from former days. Prior to prohibition many of the individuals who would be apt to drink concoctions containing methyl alcohol were confirmed alcoholics, but at the present time, individuals who seldom touch liquor might be blinded as the result of the unusual drink which chanced to be adulterated.

Dr. Chance, in commenting upon Dr. Holloway's remarks upon the difference in effects in different patients, said it might be of interest to be told of a case of blindness which was under Chance's care in 1918. A Slav met a fellow countryman whom he had not seen

since he left the old country. To celebrate their reunion they determined to get drunk. They went into a tavern, in the mining regions, asking for the hardest liquor to be had. The man had no recollection of when he left the bar, when he waked up in a hospital several days later, but he was hopelessly blind. When he came under Chance's observation there was barely light perception, because the nerves were china white. The other man went on his way apparently unaffected.

Mercuriophen in Ocular Conditions.

DRS. T. B. HOLLOWAY and A. G. FEWELL, in a preliminary report concerning mercuriophen, stated that in the study of the chemotherapy of mercurial compounds, Schamberg, Kolmer and Raiziss produced a substance, (sodium oxymercury-orthonitrophenolat, or No. 99) which they found to have marked germicidal action. It occurs in the form of a brick red powder, freely soluble and when used in diluted solution has an amber color; it contains 53 per cent. of mercury. In a menstrum of broth this compound was found to be fifty times more active than mercuric chloride and two hundred times more active when used in a menstrum rich in protein, such as serum or ascitic fluid. Further, it was found efficient in sterilizing the hands in a dilution of 1 to 40,000 after an exposure of one minute. The substance is less toxic than bichloride and is free from its corrosive action on metals.

At a joint meeting of this Section with the Section on Otology and Laryngology, in December, 1917, one of us referred to the use of this compound in dacryocystitis. Its use was continued in various types of cases until the war intervened. While the compound is not actually on the market at the present time, it is available in quantities for certain purposes and inasmuch as our earlier experiences with it led us to believe that it would prove to be of value to the ophthalmologist or ophthalmic surgeon, we have again employed it in appropriate cases during the past six months.

Still more recently it was deemed advisable to employ it in a series of corneal, conjunctival and lacrimal sac cases

and at the same time carry on certain laboratory investigations in regard to it, with the hope of possibly ascertaining in just what cases it was most efficient and also to compare it with certain other preparations, old and recently introduced, for which strong germicidal activity has been claimed. With this idea in mind Dr. Fewell has been culturing those cases of corneal ulceration, conjunctival and sac infections that have come under observation in my clinic at the Wills. Needless to say a series of cases such as we desire is built up slowly, and still more unfortunately we have already experienced difficulty in keeping the patients under adequate observation. If conditions are such that the work now under way can be successfully completed, we shall compare our clinical observations with the laboratory findings in a series of corneal, conjunctival and lacrimal sac cases.

While mercuriophen has been used in many cases of different types, judging from his clinical experience with it, Dr. Holloway stated that he felt he was safe in saying that it was particularly efficient against the pneumococcus. Sac cases clear up very rapidly when treated with it. He had also seen good results in those cases associated with corneal ulcer, altho it had not been used in any case of true *ulcus serpens*. In referring to the laboratory experiments now under way. Dr. Holloway stated that the results obtained would be due to the painstaking work of Dr. Fewell.

Paralysis of Sixth Nerve with Otitis Media.

DR. WILLIAM ZENTMAYER presented the following case of Gradenigo's Symptom-Complex. C. S., aged thirty-two years, a milk dealer, had an attack of otitis media beginning January 3, 1920. When seen by Dr. George M. Marshall in consultation with his family physician, Dr. C. B. Schoales, on January 19, there was a copious thick purulent discharge and the upper and posterior wall of the canal was bulging. There was neither tenderness nor pain over the mastoid. A simple mastoid operation was done January 23. A free incision was made into the membrane and the entire mastoid excavated to the lateral sinus, but this was not

exposed. The cells were very large even to the tip of the mastoid, and were filled with pus. A free incision was made into the middle ear by way of the aditus so that with syringe water passed freely thru middle ear and canal. Drainage with rubber tube was made in the mastoid region. The patient was freed from pain but on the night following the operation had trouble with the left eye. Paralysis of the external rectus was noticed the next morning. Drainage continued free posteriorly for ten days when it ceased.

On March 8 there was a complete paralysis of the external rectus. No other motor palsies. There were no fundus changes and the visual fields were normal. Vision R. E., = 5/10; L. E., 5/15. + 1 c. ax 90° gave 5/4 in R. E. and 5/5 in L. E. The patient had had considerable, but not intense pain over the eyes and in the temporal region. In many of the cases of paralysis of the external rectus with otitis media there has been also intense and persistent pain localized, not as ordinarily in the mastoid region, but in the frontal, temporal and parietal regions on the same side. To this group of symptoms the term Gradenigo's symptom-complex has been given. It is not necessary that the mastoid should be involved. Without going minutely into the anatomical details of the structures involved it may be pointed out that according to the description given by Wheeler, the abducens nerve after piercing the dura passes upward and forward and for a distance of 2 or 3 mm. is enclosed by an areola of connective tissue. Just in front of this it is found in contact with the periosteum at or near the apex of the petrous portion of the temporal bone at which point it enters the cavernous sinus. The small area of contact of the abducens with the petrous bone is marked by a little groove on either side of which is a spicule of bone and stretching closely over the sixth nerve is a firm ligament. To this ligament is attached the dura mater and the connective tissue layer which the nerve penetrates. According to Wheeler it is in this area that an exudate or hemorrhage or edema would be likely to interfere with the function of the abducens.

by pressure or strangulation. The pain in the area of the trigeminus is explained by involvement of the Gasserian ganglion which lies in Meckel's dural cavity and rests in a depression on the anterosuperior aspect of the petrous pyramid at its tip. It is therefore likely to become involved in any process which would affect the sixth nerve at this point.

The infection of the tip of the petrous may occur along one or more of several routes. Extension from the tympanum below the labyrinth and internal auditory meatus to the tip of the bone. From the mastoid antrum thru the subarcuate fossa, or by the carotid canal or thru a layer of cells extending along the Eustachian tube, thus passing from the tympanum to the petrous tip.

Webster points out that in some cases the paralysis of the sixth nerve has been observed after the mastoid operation has been performed, and he believes that the operation may be the chief causative factor in producing conditions at the point of contact of the sixth nerve which would produce pressure paralysis from hemorrhage or edema.

The paralysis may clear up in a few days and may clear up at once following mastoid operation, but it usually persists for weeks or months.

Spontaneous Absorption of Lens.

Dr. J. Hiland Dewey reported the case of J. A., aged thirty years, female, married, first seen February, 1918. At that time she complained of pain in the left eye, severe occipital pain and excessive dizziness, could not go about without an attendant. At this time vision in the eye was down to light perception; light projection very faulty. Had been seen by an oculist six weeks before, when the pain first started, and was told the eye was all right, but patient states that sight was good at that time.

The pupil was fairly dilated, very sluggish to light, tension normal, anterior chamber slightly shallow. Only a white reflex could be obtained from the fundus, very slight haze in lens down and in; transillumination satisfactory. The haze in lens was progressive and in about four months the lens was completely cataractous.

Wassermann, negative, von Pirquet positive. Patient all this time was very weak and greatly prostrated on the least exertion. Had tuberculin, potassium iodid and inunctions. Pain in eye and occiput together with the dizziness gradually disappeared.

In August, 1919, patient was positive there was an improvement in vision and was anxious for an operation. Light projection became perfect and shadows could be detected. At this time there was a return of pain in eye and occiput and some dizziness.

In December, 1919, there was a change in the appearance of the lens and about two weeks after it could be seen that the lens was beginning to break up into numerous irregular flocculent masses. There was no history of traumatism nor could any trace of a tear in the capsule be detected. Absorption has continued rapidly and at this date March 19, 1919, there remained only three or four small flocculent masses and the nucleus sinking behind the iris down and in. Perfect view of fundus can be obtained which appears normal in all respects. Vision with correction 5/15.

What the nature of the original pathologic change was Dr. Dewey could not say, but the cataract developing subsequently seems to have certainly undergone spontaneous absorption.

During this time patient lost no weight but has gained ten pounds in the last six weeks.

J. MILTON GRISCOM, M.D.,

ABSTRACTS

Grüter, W. **Optochin in Diseases of the Eye, Especially Serpent Ulcer.** Zent. f. d. g. Oph. u. i. Grenz. 1920, v. 3, p. 81.

The author, in an article well fortified by tables and case reports, with numerous references to the literature, goes very thoroly into the subject of the use of optochin. He discusses it under the headings of, (1) The results of experimental investigations; (2) Clinical results; (3) Causes of abandonment of optochin therapy and attempts to improve the action of the remedy; and (4) Comparison of the chemotherapy of *ulcus serpens* with other methods of treatment. His conclusions are:

Optochin is a specific against pneumococci, and has a destructive, tho less powerful, action on the streptococcus *viridans*. The action can be demonstrated both by animal experimentation and test tube experiments. The action of the remedy is greatly influenced by the temperature and length of the experiment. Addition of serum in the test tube precipitates albumin, and considerably restricts the action of the drug. Pneumococci freshly cultivated from the ulcer, or the conjunctiva, have more than 100 times the resistance to optochin than have laboratory strains; but even the freshly prepared strains show variations in their resistance. The bactericidal action of optochin is not noticeably influenced by increase in the virulence of the pneumococcus.

The solutions should be freshly prepared, as they are not stable for more than 14 days. The combination of optochin hydrochlorid with atropin sulphat is to be avoided, because of the formation of an insoluble optochin sulphat. Solutions of less than 1% are of no value in ulcer therapy, or sterilization of the conjunctiva. In ulcers with deep infiltration, it is of value to use repeated applications of 5% optochin for 5 minutes. Stronger solutions cause cauterization of the cornea and conjunctiva. Intralamellar injections, and injections into the anterior

chamber are to be avoided. Use of 1-2% solution of optochin for a couple of days will free the conjunctival sac of pneumococci for at least two days. In the treatment of dacryocystitis, optochin has only a transitory effect. The results of optochin therapy of *ulcus serpens* depend on the location of the pneumococcic focus. The deeper the infiltration, the less the benefit.

After a long use of optochin, a not unimportant irritation or cauterization may appear. Especially is this true in iritis, where there is danger of exacerbations with secondary glaucoma from the formation of a synechial ring. Repeated use of optochin causes scanty regeneration of the epithelium, which can lead to reinfection. The time of treatment is not appreciably shortened by the use of the drug. The contraindication to the use of optochin is not due to an optochin immunity of the pneumococci of the ulcer, but to lack of penetrating action and this is due to the precipitation of albumin by the drug. The remedy is not contraindicated by the treatment of ulcers by more penetrating drugs.

C. L.

Fleischer, B., and Niesenhold, E. **Traumatic Reflex Immobility of the Pupil.** Klin. M. f. Augenh., v. 64, January, 1920, p. 109.

While in tabetic reflex immobility of the pupil the disorder probably lies in the transit from a subcortical receiving center to the motor nucleus of the sphincter, in the traumatic cases it generally is due to disturbances of the conduction of the motor impulse to the sphincter, i. e., mostly residuals of a more or less complete paralysis of the third nerve in its stem, partly also in its intracerebral section. In some cases it was observed after direct contusion of the eye.

After a review of the literature a case is described in an otherwise healthy girl, aged 17, seen 6 days after her left lower lid was struck by a hay fork. Complete paralysis of the oculomotor nerve, pupil wide without reac-

tion, abducens and trochlearis functioning, disc not sharply defined, surrounding retina opaque. V. = 5/12. The other eye normal. The condition improved to a certain extent. After 13 months the temporal portion of the disc was pale, V. = 1. Normal field, some diplopia.

There was no reflex immobility, but an incomplete absolute unilateral immobility with almost complete abolition of direct and diminished consensual reaction to light; impaired accommodation and partial persistent paralysis of exterior muscles, caused by an orbital injury, similar to a case of Laqueur. The consensual, altho incomplete, reaction with almost entirely lacking direct reaction, is attributed to the partial optic atrophy, inhibiting the conveyance of the light stimulus, and not able to arouse the function in the damaged light reaction fibres of the oculomotor nerve. The prompt consensual reaction of the other pupil proved that the transmission of the light stimulus in the optic nerve was not suspended.

The authors are tempted to assume that in this case a special damage to the pupillary fibres of the optic nerve occurred. They believe that also in the other traumatic cases the seat of the disturbance must be sought in the periphery, mostly in the orbit. On account of the almost missing direct, and insufficient consensual reactions the authors assume a rather feeble impulse of convergence, thru the existence of special convergence fibres, which escaped the injury, which damaged only the light-reaction fibres. The lesion might have damaged the ciliary ganglion, so that the finer transfer of the stimulus in the ganglion was rendered difficult or impossible; but the fibres penetrating, or passing by the ganglion, viz. the supposed convergence fibres, were not affected.

C. Z.

MacCallan, A. F. Glaucoma in Egypt. Report of the Director of Ophthalmic Hospitals in Egypt, 1917.

The total number of cases of primary glaucoma examined in the Government

Hospitals of Egypt in 1917 was 2,444. The operation of trephining with iridectomy was the operation of election. Iridectomy alone was done 374 times, and trephining with iridectomy 2,550.

During the last six years 448,086 patients have been examined at the ophthalmic hospitals of Egypt, and of these 9,686 patients, or 2 per cent, were found to have signs of glaucoma. Full clinical notes of all these cases are in existence and can be referred to if required.

Cases of acute glaucoma are rarely seen, only 71 having applied for treatment during the last six years. Cases of subacute glaucoma are rather more frequent, 131 cases having been seen during the same period. The high percentage is made up almost entirely of chronic glaucoma, about half of whom do not apply for treatment until blindness has supervened, more than one per cent of all the patients who seek treatment at the ophthalmic hospitals being already blind in one eye or both eyes from this disease.

Löwenstein, A. Experimental Transmission of the Virus of Febrile Herpes. *Klin. M. f. Augenh.*, v. 64, January, 1920, p. 15.

Löwenstein proved by experiments on rabbits the difference between two such similar affections, as febrile herpes and herpes zoster of the cornea. He inoculated from the vesicles of febrile herpes of the lip, chin, forehead, and ear, of different etiologies, or virus into the corneas of 17 rabbits, producing in all an affection similar to human herpetic keratitis. The most different control investigations with the contents of vesicles of burns, eczema, pemphigus, etc., and of herpes zoster, were negative.

The virus does not lose its virulence by transmission from the cornea of one rabbit to that of another, or even a third or fourth rabbit. From the primary mixture of the contents of the vesicles in 5 cc. salt solution, weaker solutions to 1:200 were made and proved infectious. The virus is very labile, loses its activity by heating for half an hour to 56° C. in the water

bath, and after 24 hours in the incubator. It could not be derived from the blood of patients affected with herpes.

Very fine granules of different sizes are found in the spreads, which were missed in control specimens. Their pathogenic nature cannot be asserted so far. In spite of negative results of filtration experiments, it is probable that the virus may pass thru the Berkefeld filter. Recovery from an inoculation herpes, leaves, like affections by chlamydozon, a histogenous local immunity.

The inoculation keratitis is an infiltration of the parenchyma of the cornea with polynuclear leukocytes leading to colliquation. In the stratum directly exposed to the virus Löwenstein found cystic degeneration of the epithelium, formation of vesicles, melting of Bowman's membrane, and glassy anuclear mortification of the upper layers of the parenchyma. C. Z.

Barraquer y Barraquer, I. Modern Extraction of Cataract. La Clinique Oculistique, April, 1919.

After a general review of the operations for cataract extraction now practised the writer concludes that the aseptic technic must be applied to the seat of operation, the utensils and instruments, the operator and the patient. For the latter he washes the lids with soap, and disinfects the lashes with 4 per cent silver nitrat solution. The conjunctival sac is washed out with physiologic salt solution, which he finds as efficient as the antiseptics sometimes employed. He operates in sterilized cotton gloves. The upper lid is raised on a Desmarres' elevator, the lower controlled with the fingers and the eye fixed with forceps of Landolt. The most complete operation, he thinks, includes a conjunctival flap with a suture. Iridectomy should be avoided, but if thought to be necessary the peripheral iridectomy may be used. He employs eserine to produce miosis after the operation, having previously dilated the pupil with euphthalmin. The lashes may be smeared with a sublimat ointment, but need not be

cut off. The dressing is to be confined to the region of operation.

The best method of extraction is by phacoërrisis (from the Greek "phakos" (lens), and "erio" to draw out), removal by suction; which he began in ignorance of the earlier cases of Hulen, and of that of Coderque published subsequently, which was confined to the eye of a dog. His operation, illustrated elsewhere (page 721), is done with the instrument called an erisphake. This consists essentially of a handle into which is fitted a hollow tip cupped to apply the vacuum to the front of the lens. To this is attached by flexible tube a suction pump with a regulating chamber capable of quickly establishing and maintaining a vacuum equal to at least 50 mm. of mercury. The tube of the tip can be instantly connected with this vacuum or with the atmosphere by the spring valve in the middle of the handle, which is controlled by the thumb. Barraquer dwells on the importance of having all parts of the instrument work quickly and smoothly. The vacuum may be secured from either one of several pumps worked by electric power that are now on the market, for other uses.

E. J.

Roelofs, C. O., and Zeeman, W. P. C. Visual Acuity in Reduced Light. Tydschr. v. Geneesk., June 14, 1919.

These writers would unravel some obscurities of night blindness by an elaboration of our physiologic knowledge. In this connection the meaning of night and twilight must be determined by the strength of the illumination and the strength of contrast between different objects. This being determined the question arises as to the sensibility requisite at night and in twilight. The threshold of the light sensibility must be determined, and the visual acuity under weak illumination and slight contrasts. Conditions of mind and body must not be overlooked. Therefore, besides the adaptation power, the construction of the eye, the clearness of the media, and pupillary width, we have to consider exercise, fatigue, concentration of attention, etc.

Yntema has determined, at the Astronomical Laboratory at Groningen, the quantity of light which reaches the Netherlands on a cloudless night in March or April. This could be estimated at 0.00057375 Meter candles (M. C.). Suppose the starlight is evenly divided a horizontal object will be illuminated most favorably. But as the rays fall at very different angles the actual illumination will not reach 0.0003 M. C.

When we examine the light sense threshold value, after light adaptation, the object can be seen with an illumination of 0.11836 M. C. The threshold value alone is an insufficient measure for the ability to move in weak light, a certain distinction of objects is necessary. An investigation of visual acuity with very weak illumination should be made. It seems that the sensitivity for differences of direction is here of more value than the power to observe two points separately.

Before the milk glass plate of the light sense measure, a glass plate was put with certain opaque objects. (1) A black, 1 cm. broad bar, in the middle of which was a break of 4 cm. In this interspace a rectangle 2 by 1 cm. was displaced 0.1 cm. toward the right or left of the space. A series of squares separated by their breadth 3 mm. A series of squares 1.5 mm. each. Six small parallel lines of 1 mm. wide and 11 mm. long.

With different degrees of illumination of the milk glass plate the distance was now determined at which the objects were recognized in their true aspect after a dark adaptation of 20 minutes.

It was demonstrated that increase of light augments the visual acuity—in fact with arithmetic series with the increase of light; and when perception is near a minimum a more extensive and more accurate investigation must determine if the graph composed of the logarithms of the light strengths and the logarithms of the angles really forms a straight line. With increase of the light intensity the perception becomes regularly smaller and there is a regular increase in the sensibility for

direction differences as measured with the bar. There seems to exist a fixed relation between the smallest observable difference of direction and the angles which represent the perception circle and smallest perception width. With an illumination as from the clear starry heaven the perception circle of Roelofs is about $1^{\circ} 21'$; of Zeeman $3^{\circ} 15'$; and is the smallest difference recognizable for the normal eye for Roelofs $7' 14''$; and for Zeeman $14' 19''$, which corresponds with a vision of about $1/40$ to $1/50$ by the clinically employed methods.

This acuity found for different illuminations is for sharp contrasts such as between white and black objects. Other values will be found with less strong contrasts. Hulshoff Pol in 1917 made determinations of visual acuity with changing illumination using black or white figures against a series of gray backgrounds. The reflecting power of the white objects was twenty times that of the dark objects. If we want to know on a starry night our vision for dark objects, which only reflect $1/20$ of the white objects, then we have to conclude from our data how great the acuity for twenty times smaller illumination, that is 0.0003

$$\text{————} = 0.000015$$

20

M. C. The above described objects cannot be recognized even at 25 cm. distance.

Visual acuity appears therefore dependent on illumination, but large changes in the illumination are accompanied by relatively small changes of acuity. Only a very small acuity is necessary to allow a free movement in twilight surroundings. This makes it improbable that small deviations in light sensitivity will explain complaints of night blindness. An increase of the threshold value must be a rather important or sole cause of night blindness.

The foregoing conclusions were reached with two emmetropes. It was now necessary to find out how persons with diminished visual acuity thru refraction anomalies or abnormal pupils see with diminished illumination. The

investigations were repeated with lenses, +2, +4, +8, -2, -6 D., or with stenopaic openings. The objects were squares of 8x8, 4x4, 2x2, 1x1, and 0.5x0.5 cm. and 3x3 mm., space between being the same as the squares. The examinee was placed at 5 meters from the test. The smallest light quantity was found wherewith the two squares could be seen separated. It was found that persons with artificial refraction anomalies do not show an altered light sensitivity. The quantities of light necessary for reaching certain degrees of vision are, however, much higher than for the naked eye. Even the strongest illumination was unable to bring the acuity higher than the maximum found for that refraction anomaly. It seems therefore that with such feeble illumination that the emmetrope can orient himself with difficulty, the ametrope is entirely helpless, or in any case is much at a disadvantage. With a small opening before the eye the threshold value is found higher. With higher illumination, however, the sharpness of the image with a small pupil, favorably influenced it.

The clearness of the media has a different influence. Koeppe and Schieck have described a peculiar combination of congenital lowered transparency of the lens with hemeralopia and without other ocular changes, which they demonstrated in ten cases.

In older persons the yellow lens absorbs especially the blue rays; and this with uncorrected hyperopia will explain their tendency to night blindness. Psychical influences, training and fatigue also play their part.

E. E. B.

Ferree, C. E. and Rand, G. Zones of Color Sensitivity in Relation to Intensity of Light. *Amer. Jour. Physiol. Optics*, July, 1920, pp. 185-213.

These writers have made an experimental study of the effect of intensity of illumination upon the color fields. The investigation was given the following form. (1) An attempt was made to find out whether by means of

a spectroscopic apparatus, which was designed especially to give high intensities of light, stimuli could be obtained which would be sensed as color to the limits of white light vision. (2) The effect on the extension of the limits and on the shape of the zones of sensitivity of varying the stimuli thru quite a wide range of intensities was investigated. And (3) the determination of the limits was made in sixteen meridians with all of the lights made equal in energy to the blue of the prismatic spectrum employed, and with 1/32 of this energy.

They found it was quite easy to obtain an intensity of light for the red, yellow and blue wave-lengths that could be sensed to the limits of white light vision. In fact these wave-lengths in the spectrum employed were considerably above the threshold at the limits of white light vision in the sixteen meridians investigated. The limits of the green of this spectrum, however, fell far short of the limits for white light; nor could the zone of sensitivity be widened as much as 1 degree by increasing the current in the Nernst filament from 0.6 to 0.8 ampere.

The bearing of these results on the work of the clinic may be indicated in part as follows: In the practice of perimetry as applied to diagnosis it is commonly accepted that the field of vision for the normal eye may be divided concentrically in the following order: white light and form, blue, red and green. It is obvious from the foregoing results, (a) with stimuli taken from the prismatic and equal energy spectra and (b) from the effects obtained by varying the intensity of the stimuli, that the responsibility for such a rating of the color fields rests for the greater part with the relative intensities of the pigment stimuli used in the work of the clinic. That is, the limits of sensitivity to red, yellow, blue, and white light for stimuli of high intensities are coincident; for stimuli of lower intensities taken from the prismatic spectrum they are rather widely concentric; and for stimuli of equal energies of the order of intensity, roughly

speaking, represented by the pigment stimuli, they are interlacing.

Another feature of interest is the claim that has been made by certain clinicians but not generally accepted, that the interlacing of the limits for blue and red indicates a pathologic disturbance in the relative distribution of sensitivities. It is fair to note that pathologic disturbances are only one set of factors that may contribute to

such a result, and that widely different results may be gotten with the same eye with no greater difference in the test conditions than may occur from time to time in the same clinic or laboratory unless a clear understanding is had of the factors which affect the apparent powers of response of the peripheral retina and adequate means are exercised for their control.

E. J.

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CATARACT OPERATIONS.

Of devising many operations there is no end, and much study of them is certainly a weariness of the flesh. The opportunity to have one's name attached to some newly discovered disease is limited; but there seems no limit to the number of possibilities for devising an operation or an instrument that will carry it around the world. For one hundred and seventy-five years now, cataract knives and cataract operations have been performing this function for the ophthalmic surgeon.

Ever since Daviel introduced cataract extraction it has been the star operation in ophthalmic surgery. There have been countless modifications, developments, even fashions in the ways of performing it and the instruments used. This is in harmony with the importance of the procedure, the different points of view from which successive generations approached their work, and the certainty that real progress in surgical methods will continue to be made in the future as in the past.

This movement is illustrated in the present issue of this JOURNAL. For

seventeen years the "Smith-Indian" operation for extraction of the lens in its capsule has been before the profession, and during that time has given rise to a very considerable mass of literature. As is usually the case with any new procedure, the great bulk of this literature has been favorable to it. Those who think the operation an important advance give it the most attention and write about it. Those who think it unimportant or inferior to other methods give it less thought, and incline to let it pass into the oblivion they think it deserves. Only when its advocates are felt to be unreasonable and annoying in their claims or suggestions, does an aggressive voice or pen support the negative.

An absolutely new procedure that very few have tried, or have even seen or thought about, cannot be judged by its popularity. But the value of a method that has been long enough before the profession to be widely discussed and tried, may be fairly estimated by the proportion of those, who having tried it or seen its results in other hands, take it up and continue to use it. When this verdict has been ob-

tained, it is not likely to be changed. Only a modification that changes the character of the operation introducing new elements and problems is likely to alter it. It must be admitted that the great majority of ophthalmic surgeons have for their own work decided adversely to the Smith-Indian intracapsular extraction.

In the case of extraction of the lens in its capsule, the introduction of suction, to seize the lens and shake it loose from its attachments, may be the modification that will reawaken interest and furnish a new starting point for debate. It is ten years since Hulen described a method of catching the lens in a vacuum cup. But he did not perfect the apparatus for making and sustaining a controllable vacuum; as Barraquer has done since. So that the operation proposed by the latter may be regarded as one on which the profession in the greater part of the world has not yet had the opportunity to pass an intelligent judgment. What that judgment will be, only time will show.

Before any new procedure has been fully tried, and the general verdict of the profession upon it has been made manifest, each operator who deals with cataract, and endeavors to keep abreast of the advances in ophthalmology, must carefully consider each new proposal and decide whether it appeals to him as probably an advance. In such consideration his own experience and certain general principles unite to render a tentative judgment. This judgment may need later to be reversed; but at the start one who knows the behavior of the eye after operative injury must and can rest on it with some confidence.

It is certain that intracapsular extraction will never be adopted on account of the arguments based on false premises; that have been put forward in its favor, not so much by Col. Smith as by some of his followers in search of some new argument in favor of the method.

It will not be accepted because operation for "capsular" or "after" cataract is always required, or is danger-

ous. There can be found in the literature statistics that show the operation for secondary cataract may be dangerous. But since the introduction of the knife-needle thru the vascular limbus, rather than thru the clear cornea, has been practiced, the operation is practically devoid of danger from infection. When the capsule is left in the eye it frequently permits as good vision, without any secondary operation, as is obtainable by the intracapsular operation. In about half the cases the second operation is not needed.

Intracapsular extraction cannot be advanced as the only method of extracting unripe cataract. Before its introduction most operators had extracted unripe cataracts with capsulotomy; until they had found this operation about as safe as for mature cataracts. Often the unripe cortex disappears entirely without further interference, before the eye has passed thru the period of rapidly changing postoperative astigmatism, and can safely be used for ordinary occupations.

Neither is the intracapsular method the only way to avoid the postoperative inflammation due to the presence of cortex in the anterior chamber. Opening the capsule at its periphery as was done by Herman Knapp for many years before his death, or such opening by the linear cut with the cataract knife, practiced by the writer, gives equal immunity from postoperative inflammatory reaction. Even washing out of the anterior chamber, as resorted to in various ways, gives much the same immunity.

Intracapsular extraction can never be established in the favor of the profession by accusing the "capsulotomy method" of faults that are not necessarily connected with it. But this does not imply that under certain circumstances the removal of the whole lens, including its capsule, at one operation may not often offer great practical advantages over any operation the full advantages of which require the patient to remain under observation for a considerable period. It is possible, too, that the suction method of Barraquer may prove to be an improved

or perfected intracapsular method; and free from dangers attending pressure required to rupture the suspensory ligament of the lens, and so it may bring intracapsular extraction into more general favor.

The seriousness and formidable character of cataract extraction depend largely on the length of the incision required to furnish adequate outlet for the senile crystalline lens. Discission, linear extraction, or the old suction operation on a soft lens, are much less formidable. Iridectomy is nothing like so serious a menace to the health of the eye. It can be predicted with probability that the next radical change proposed for the operative treatment of cataract will be some method of cutting to pieces, or crushing, the firm nucleus; permitting the removal of the lens thru a relatively small opening. The crushing of stone has largely replaced lithotomy, which in some ways corresponded in general surgery to cataract extraction in ophthalmology. A carefully worked out technic, that would make possible removal of the senile nucleus of the lens thru an 8 mm. incision, would certainly attract attention and become a starting point for new advances.

E. J.

GRADED EXAMINATIONS IN OPHTHALMOLOGY.

America does not always look to "conservative Britain" for radical changes in professional institutions. But it must be admitted that in the matter of examinations to test fitness for ophthalmic practice, the Conjoint Board of the Royal Colleges of Physicians and Surgeons in London has taken a decided step in advance of the American Board for Ophthalmic Examinations. It has announced that graduates in medicine with a registrable qualification may at any time enter for part 1 of the examination, which includes the anatomy and embryology of the visual apparatus, the physiology of vision and elementary optics.

This plan has important advantages

over that of requiring the needed clinical experience, as evidenced by attendance on clinics, assistantships, etc., or reports of clinical cases, before admitting the candidate to examinations on anatomy, histology, pathology, physiologic optics and diagnostic methods. For the young man fresh from University and State Board examinations, those on the fundamentals of ophthalmology will seem much less formidable or embarrassing; he will be much more likely to try for the evidence of higher qualification at this time, than after years of freedom from such tests and divergence from systematic and laboratory studies. After attention has been turned to clinical work he will be more disposed to meet requirements of case reports, or the clinical examination into his working methods.

But the great advantage of the divided, or graded examination is that it will emphasize the importance of training in fundamentals, before taking up the clinical work in ophthalmology. Those of us who have grown up under the old regime are far more generally lacking in the fundamental training than in clinical experience. And the defects that exist in our clinical knowledge are closely associated with our lack of fundamental training. There is an enormous waste of the student's time in attempting to follow the work of a clinic, before he knows the anatomy and pathology of the structures involved in the diseased conditions presented. More than that the proper insight into disease never can be obtained without the interpretation that fundamental training furnishes.

There is economy of time by concentrating attention first on certain related studies, and then on others that naturally belong together. The course of study in preparation for medical practice is already too long, as compared with the period of human development and active life; and every change that will economize the students' time should be made. The practical spirit of the American profession should be quick to adopt this improvement in the way of testing fitness for

ophthalmic practice, and of indicating to those who are preparing for it, the rational and effective way to pursue their studies.
E. J.

BOOK NOTICES.

Der Augenhintergrund bei Allgemeinerkrankungen. By H. Köllner, M.D. Prof. at Würzburg. 8 vo., 190 pp. with 37 illustrations, 27 in colors. Berlin, Julius Springer. Price in paper 38 marks.

This guide for physicians and students gives an excellent account of the changes in the ocular fundus in general diseases. Its scope is somewhat broader than its name implies, for the first dozen pages are given to the technic of the examination, and ten more to the ophthalmoscopic appearances of the normal eye ground. The general pathology of the retina of the choroid and of the optic nerve occupy 25 pages; and then the special pathology of the various diseases is taken up.

Matter relating to special pathology occupies 125 pages. It is classified under infectious diseases including septic and acute infectious diseases; malaria, tuberculosis, and syphilis, acquired and congenital. Then come diseases of the respiratory organs, those of the digestive organs and sexual organs including the ophthalmoscopic changes in the fundus of the new-born. Nephritis, diseases of the circulatory apparatus, blood diseases such as the anemias, the so-called hemorrhagic diathesis, diabetes, exophthalmic goiter, diseases of the cerebro-spinal system, and the nasal sinuses are considered, and also the poisons that produce ophthalmoscopic changes.

There is an adequate index of subjects. No index of authors is needed for no authorities are cited for the statements made, and no attempt is made to credit authors for the various observations given. The book simply undertakes to give what is already common professional knowledge. This is given in brief condensed form, the facts included being generally well chosen. The illustrations are in half-

tone and both in colors and in black serve to give meaning to the descriptions of the appearances to be looked for. Altho the paper has the high finish suiting it for half-tone reproductions, the letter press is also very clear, and the whole work creditable to both author and publisher.
E. J.

The American Red Cross in the Great War. Henry P. Davison. Small 8vo., 302 pp., 7 illustrations. New York, The McMillan Co.

This account of Red Cross activities by the Chairman of its War Council will be of interest to many people; but contains little referring to ophthalmology. It is calculated to bring permanent support to the organization, by spreading a comprehension of the varied emergencies that such an organization can best meet even in times of peace. One of these is the care and re-education of the blinded soldier. What is done for the disabled is here illustrated by the man blinded. "If in the first stage of hospital treatment it is thought possible that his vision will be permanently lost, the work of re-education begins without his knowledge. From that time on,—even while he is yet ignorant of the truth,—the doctors are "teaching him to be blind." While his eyes are still covered with an unnecessary bandage, perhaps, he is taught to do for himself things that the blind do, such as shaving and finding his way about."

"By the time the blinded man discovers the truth the crushing force of the blow has been broken. From that point onward,—on the journey home and at every stage he must pass before the last hope of saving his sight is abandoned,—he, unconsciously, is being trained in the rudimentary lessons of blindness."

A survey of the industries of the country shows that about 3 per cent of the manufacturing industries involve work which blinded men can do satisfactorily. In some branches blind men are more efficient because of their closer concentration and developed sense of touch.
E. J.

BIOGRAPHIC SKETCHES.

THOMAS H. SHASTID, M.D.,

SUPERIOR, WISCONSIN.

ALT, GUSTAV ADOLF FRIEDRICH WILHELM. (Ordinarily only "Adolf Alt" was employed by the Doctor himself.) A famous American ophthalmologist, a copious contributor to the literature of ophthalmology, and founder in 1883 of the first ophthalmologic journal published west of New York City. He was born at Mannheim, grand duchy of Baden, Germany, Aug. 13, 1851, son of Dettmar and Maria Alt, the father being a well known physician.

The son commenced the study of medicine in 1869, but, his father dying in 1870, and the Franco-Prussian war breaking out, he enlisted in the 2d regiment of Baden grenadiers. After participating in eleven battles, he returned to the study of medicine at Heidelberg in 1871. In 1872 he migrated to Strassbourg University, but in the following year, returned to Heidelberg, where he received his medical degree with honors, in March, 1875. Having completed his term of military service in the medical department of the 47th infantry, he removed, in September, 1875, to America.

For almost two years he was first assistant to Dr. Herman Knapp, in the New York Ophthalmic and Aural Institute. A part of this time he lectured on the normal and pathologic histology of the human eye.

In 1879 he removed to Toronto, Ont., where, upon examination, he became a member of the College of Physicians and Surgeons of Ontario. He was also appointed lecturer on ophthalmology and otology in the Trinity Medical College. In 1879 he published simultaneously in Germany and New York a volume entitled "The Normal and Pathological Histology of the Human Eye." In 1880 he removed to St. Louis, Mo.

The Doctor's success in the rapidly growing western city is known to every ophthalmologist. His practice was very large and came from many states.

He was author, in St. Louis, of several volumes on the eye, and also of valued articles on ophthalmology which number into the hundreds. In 1883 he founded, and, till its merger in 1918 with the present JOURNAL of the same name, continued to edit, "THE AMERICAN JOURNAL OF OPHTHALMOLOGY." He was also, until his death, a member of the Editorial Staff of this JOURNAL. He was a member of the St. Louis Medical Society, the Missouri Medical Association, and the American Ophthalmological and American Otological Societies. He was one of the founders of the American Academy of Ophthalmology and Otolaryngology. Shortly after removing to St. Louis he was made Professor of Ophthalmology in the Beaumont Hospital Medical College, and later (1901-03) held the same post in the St. Louis University Medical School, and the Marion Sims-Beaumont School of Medicine. About nine years ago he left the last-named school for the Washington University Medical School, which made him Professor Emeritus in 1917.

Dr. Alt was a short, stout man, 5 feet 6 inches high, weighing, as a rule, 180 pounds. His hair was brown, his eyes blue. He wore almost invariably a mustache. A man of decided opinions, he was never quarrelsome, and the strongest condemnation which he passed upon professional brethren was, ordinarily, some such expression as "How are the mighty fallen!" He was extremely fond of animals, of children, of painting and of music. His chief recreation was playing the violin. He founded, and was for a long time president of the Cecilia Society of St. Louis. He was a Republican in politics, a believer in Christ but not a church member.

The Doctor married, in 1879, while still a resident of Toronto, Helena Bogardus, daughter of Dr. D. Hough-taling, of Albion, N. Y. To the union were born two children—Arnold D. and Bertha.

In 1918 Dr. Alt was taken ill. He had been steadily failing, and was a

chronic invalid from myocarditis for two and a half years. He died June 28, 1920. The interment was had at

the Belicfontaine Cemetery and was private. The doctor was survived by his widow and the son.



Adolf Alt. 1851-1920.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities.

DEATHS.

Dr. Albert Antonelli, a prolific writer for French ophthalmic journals, and a Chevalier of the Italian Legion of Honor, is dead.

Dr. J. Bjerrum, a leading ophthalmologist of Denmark, is dead at the age of 68.

Dr. Charles D. Ferguson, Oklahoma City, Okla., aged forty-five, died in Corpus Christi, Texas, June 11th, from ruptured aortic aneurism.

Dr. Richard Nunn, for many years Professor of Ophthalmology and Otology in the Medical Department of the University of Oregon, died suddenly, recently. Dr. Nunn served in the British Army from the early part of 1915 to the close of the war.

PERSONALS.

Dr. F. W. Edridge-Green has been appointed a special examiner in color vision and eyesight by the London Board of Trade.

Dr. C. C. Rush, who spent some time in ophthalmic practice in China has returned to the United States, and has located at Johnstown, Pa., with offices at 402 Grove Street.

Dr. Frank Allport's many friends will be gratified to know that after a serious illness, which kept him in the hospital for several weeks, he is convalescing nicely and able to partially resume his office duties.

The Transactions of the Luzerne County Medical Society. Volume 21, has just appeared under the editorship of Dr. Lewis H. Taylor, of Wilkes Barre, Pa.

Dr. Thomas B. Holloway, has been appointed Vice-Dean for the Faculty of Ophthalmology in the University of Pennsylvania; Drs. Luther C. Peter, William T. Shoemaker, William Zentmayer, and L. Webster Fox, Professors of Ophthalmology; Drs. Leighton F. Appleman, and B. F. Baer, Associate Professors in Ophthalmology, and Drs. H. M. Largdon, Oliver F. Mershon, E. B. Miller, E. A. Shumway, G. S. T. Kelly, Albert A. Beck, and Alfred E. Cowan, assistants in Ophthalmology. Drs. A. C. Fewell and John E. Medley have been appointed instructors.

Dr. Gilbert Seaman, of Milwaukee, Wisconsin, has, as a result of much urging, announced his candidacy for the Wisconsin gubernatorial nomination. Dr. Seaman is not only a veteran ophthalmologist in civil life, but he served on the medical corps throughout the Spanish War, and, at the very entrance

of America into the World War, enlisted with the Wisconsin National Guard. With the rank of Major he was made chief surgeon of the 32d Division. Just before the armistice he became chief surgeon of an army corps, with the rank of Colonel. It is much to be deplored that doctors generally do not go more into politics, for Congress and the various legislatures stand in need of the special knowledge and experience of doctors.

SOCIETIES.

At the Eighth Annual session of the Pacific Coast Oto-Ophthalmic Society held in Portland, Oregon, July 29th to 31st, the following officers were elected: President, Dr. George W. Swift, Seattle; Vice-Presidents, Drs. Edward E. Maxey, Boise, Idaho, and Joseph O. Chiapella, Chico, California; and Secretary-Treasurer, Dr. Ernest C. Wheeler, Tacoma, Washington. The ninth annual meeting will be held some time next June en route to Alaska, on a boat chartered for the purpose. The meeting this year was well attended and was very instructive scientifically.

MISCELLANEOUS.

It has been known for many years that trachoma has been exceedingly prevalent in a number of sections in Illinois. The State Department of Public Health has completed the preparation of a set of rules and regulations for the control of this disease.

As the Transactions of the American Ophthalmological Society are now in cloth binding and the cost of printing and producing higher than prior to 1917, the price of the volume is now \$5.00. Orders should be sent to the Secretary, 1819 Chestnut Street, Philadelphia, Pennsylvania.

Lt. Col. F. P. Maynard, who prior to the breaking out of the war was a collaborator of the Centralblatt für praktische Augenheilkunde, for a time was dropped from the list on its title page, and to his annoyance finds that his name again appears as a collaborator. He would like his colleagues to know that it was without his consent that his name was again associated with that journal.

A medical examination conducted on behalf of the American Red Cross in Algeria and Tunisia recently, disclosed the fact that in the oasis towns of the Sahara ten per cent of the native population is blind. It showed, too, that the present epidemic of trachoma has

made its greatest headway among the younger children, both native and European. Of 6,025 children examined in different parts of Algeria, 1,650 or twenty-four per cent were trachomatous. Dr. Edmond Sergent, Director of the Pasteur Institute of Algiers, in one small settlement in the department of Oran, found one-hundred and fifty-six trachomatous cases among a total of two-hundred and thirty-six inhabitants.

The law on Ophthalmia Neonatorum which has been enacted by the state of Illinois, is specific enough in its wording to prevent misconstruction or to allow for any excuse for failure to report cases. If the provisions of the two following sections are observed it should do much in eliminating this prolific cause of blindness:

Section 1. Any diseased condition of the eye or eyes of any infant, in which there is any inflammation, swelling or redness in either one or both eyes of any such infant, either apart from or together with any unnatural discharge from the eye or eyes of such infant, at any time within two weeks after birth of such infant, shall, independent of the nature of the infection, be known as ophthalmia neonatorum.

Section 2. It shall be the duty of any physician, surgeon, obstetrician, midwife, nurse, maternity home or hospital, of any nature, or parent assisting any way whatsoever, any woman at childbirth, or assisting in any way soever any infant, or the mother of any infant, at any time within two weeks after childbirth observing or having a reasonable opportunity to observe the condition herein defined, and within six hours thereafter, to report in writing or by telephone, followed by a written report, such fact to the local health authorities of the city, town, village, or any other political division as the case may be, in which the mother of any such infant may reside; provided, that such reports and the records thereof shall be deemed privileged information and shall not be open to the public.

The Royal London Ophthalmic Hospital the earliest special hospital for diseases of the eye every year treats over 2,300 in-patients and over 40,000 out-patients from all parts of the United Kingdom. It has a world wide

reputation as a center for ophthalmic teaching. But it is now in very urgent need of help, to carry on its national work of saving or restoring eyesight.

The outstanding facts shown by its accounts are that in the past year the income fell short of the expenditure by 4,665 pounds. It would be misleading to conclude that there has been a general decrease in the various items which form the total income for the year. The annual subscriptions which have lapsed from ordinary causes have been made good by new subscribers; but donations have fallen from 4,306 pounds in 1918 to 3,252 pounds in the past year. The income from donation boxes, which represent contributions from patients and their friends is greater than it has ever been before.

The expenditure has been heavy on account of the increased prices of all commodities, and the general increase in salaries and wages.

From the Income and Expenditure Account it is clear that a considerable increase of income must be obtained if the work of the hospital is to be carried on. It is not unreasonable that a hospital which has only a small endowment should look in the first place for some support from those who benefit by the treatment which is given. The Committee believe that when patients realize the serious financial position of the hospital they will give as generously as they can, and there will be further increase from the donation boxes.

The Committee invite every subscriber to increase his subscription if he can afford to do so, and endeavor to obtain new subscribers. They hope that by systematic appeals the range of contributors may be made wider. It is not right that the national work of this hospital should be supported by only some 1,500 persons. It is stated that nine out of every ten persons take no part in supporting voluntary hospitals. In some measure the reason for this must be that they do not realize the fact that the work of voluntary hospitals benefits every one, rich and poor alike. But for the training given by hospitals such as this there would be no ophthalmic surgeons or nurses. This voluntary hospital is carrying on work which benefits all people.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colo.

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RUPTURE OF CORNEA BY CONTRECOUP FROM BULLET WOUND OF ORBIT

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Three cases are here reported in which a bullet penetrating the back end of the orbit caused this lesion. Experimental injuries of the kind on freshly killed sheep and dogs, and on living animals under a general anesthesia seems to show that the corneal injury is due to a contusion of the posterior pole of the eye.

Some twenty years ago I saw a case of the type indicated in the title; and after passing the intervening years without seeing another or without seeing any description of this form of accident, I have seen two other cases within the last year. The first was as follows:

CASE 1. A. B., age nineteen, attempted to commit suicide by shooting himself thru the left temple, with a revolver (calibre not noted). Finding that he was still alive after the first shot, he fired another into the cardiac region.

Dr. McClanahan, who was called, found him still living and asked me to see what was wrong with the left eye. The first bullet had entered the left temple about $1\frac{1}{4}$ inches back of the orbital margin. There was considerable blood upon the eyelids and face and as, on opening the lids, I found the cornea ruptured, I jumped to the conclusion that the bullet had gone out thru the cornea. Closer inspection, however, after clearing away the blood, showed plainly that the wound of exit was thru the bridge of the nose, and as the cornea lay about an inch to the side of the line between the wounds of entrance and exit, it was plain that the rupture, which extended entirely across the cornea in a horizontal line, was due to contrecoup from behind. The eye was sightless. The second shot had evidently wounded the heart, altho it was beating feebly and rapidly. Death occurred a few hours later. The eye was not obtained for further examination.

CASE 2. A man, aged forty-two, bent on obtaining liquor from an illicit joint, was mistaken for an officer and shot by

one of the inmates. The bullet entered the left temple one inch behind the orbital margin on the line of the palpebral fissure; and was shown by the X-ray to be lodged near the outer wall of the right orbit, about as far back as the entrance wound. The right eye was sightless and pushed forward, with extensive hemorrhage under the conjunctiva; fundus dark.

The cornea of the left eye was broken into several pieces by three or four radial ruptures extending back into the sclera; the eyeball was empty. This case was first seen by Dr. Bushman, to whom I am indebted for details of the X-ray examination; and who treated the eye as if it had been eviscerated in the ordinary way. The right eye developed no reaction and after several months showed practically no atrophy; anterior media clear and fundus covered with connective tissue; no light perception.

CASE 3. A young man of twenty-two years shot himself with a 32 revolver thru the right temple, an inch back of the margin of the orbit, slightly above the line of the lid fissure. He was referred to me by Dr. J. E. Summers. The radiograph showed the bullet near the roof of the left orbit about an inch and a half back of its upper margin. The right eye was ruptured in a manner very similar to that in Case 2, there being practically nothing left in the eyeball but a few shreds of uveal tissue and some blood. In both cases the cornea was so thoroly shattered that it seemed as if some of it were actually missing.

The left eye showed moderate exophthalmos with very slight motility in any

direction; complete ptosis. The vision was counting fingers at about two feet. The appearance of the radiograph made the task of removing the bullet seem so easy that, after completing the evisceration of the right eye, I attempted to extract the bullet. It was felt with the probe but on attempting to grasp it with forceps, it slipped away into the orbital fat and, for fear of causing fresh hemor-

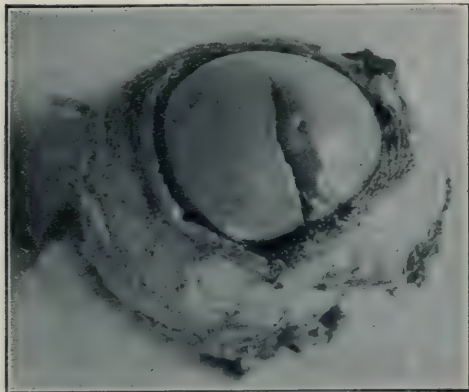


Fig. 1—Dog's eye with incomplete rupture of cornea produced by perforating bullet wound of body of eye.

rhage which might further injure his sight, I desisted, with the conviction that I had been foolish to make the attempt. Luckily I had done no harm, as the sight continued to improve until, after six weeks, it reached 20/100; and there have been no signs of any further disturbance from the bullet.

In attempting to explain the production of such an injury, the query naturally arises: Is the rupture of the cornea due to impact of the bullet on the posterior part of the globe? Or is it due to the explosive effect of the bullet on the soft tissues of the orbit? Or, finally, is it due to the effect of gas blown into the orbit directly from the muzzle of the gun?

The last supposition receives some support from the fact that in two of the cases the wounds were self-inflicted; but in the third case the gun, a 32 revolver, was held at least three or four feet from the victim's head. Furthermore, our experiments do not support this view.

The second supposition, that the bullet produces in the orbit the same sort of explosive action that Lagarde and others

have found to occur when a bullet, at short range, hits a tightly sealed can full of water, is supported by the fact that in the last two cases the bullet entered the orbit so far back that it seemed as if it must have passed thru to the other side without touching the globe; moreover the examination of the stump in Cases 2 and 3, showed no certain sign of a posterior wound of the globe. It is possible, however, that the bullet may have struck the globe so far back as to dent it without penetrating it.

EXPERIMENTAL INJURIES. In the attempt to get more light, Dr. Sanford Gifford and I have attempted to reproduce this form of injury in the eyes of sheep and dogs. In a dozen fresh, skinned sheep heads the intraocular tension was raised by injection to approximately normal, and shots were fired through the posterior part of the orbits with a 32 revolver and a 22 rifle, with muzzle at contact or a short distance away.

In one case only was there an anterior rupture. In this case, the 32 bullet passed through the center of the ball from side to side and there was a half inch rupture of the sclero-corneal margin, both above and below. In all the other cases, even when the bullet made quite a hole at the posterior pole, or when the eye was pushed forward and extensive circum-corneal emphysema occurred, the cornea and anterior part of the sclera remained uninjured.

Thinking that these negative results might be due, either to the very stiff thick sclera which the posterior half of the sheep's eye possesses; or to the lack of tension in the dead orbital tissue, we then tried shooting through the orbit of etherized but living dogs. In the case of five eyes, in which the bullet passed behind the eye, there was no injury to the globe either in front or behind. Out of seven eyes which were hit by the bullet, the cornea and anterior sclera remained uninjured in all but two.

In one of the two the bullet passed in $\frac{2}{3}$ back toward the pole and passed out just outside the limbus. In this eye, a linear rupture clear across the cornea occurred, one end of this rupture uniting with the bullet wound in the limbus. In

this case the lids were partly closed by a hemostat in order to reproduce to some extent the closure of the eye lids which it is presumed would occur when a man shot himself.

In another eye, in which the lids were not closed, the bullet passed thru the globe from side to side almost $\frac{1}{3}$ of the way back to the pole. In this case, there occurred a linear rupture going clear across the cornea but leaving the membrane of Descemet and a very thin layer of the posterior part of the cornea unbroken. (See Fig. 1.) These two eyes gave a very fair reproduction of the corneal condition found in my first case.

CONCLUSION.—To sum up, it may be

said that while the anatomic condition of sheep and dog eyes do not permit the reproduction of the conditions observed in my cases 2 and 3, the cases in which corneal ruptures were obtained in dogs indicated strongly that in all of my patients the damage to the anterior part of the globe was due, not to the entrance of gas into the orbit nor to any explosive effect on the orbital tissue, but to a contusion of the posterior pole of the eye.

It is quite certain that others must have seen this form of injury, but I have seen no report of anything of the kind either before or after the war; and I think it deserves a place as a typical form of rupture by *contrecoup*.

REPORT OF TWO CASES OF KROENLEIN OPERATION

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One of these cases proved to be a firm tumor of the apex of the orbit including the optic nerve. The other was a portion of a knife embedded in the depths of the orbit and middle cerebral fossa. The ocular findings are reported by Drs. A. E. Ewing, A. Collasowitz, and John Green, Jr. Clinical history by Dr. R. P. Scholz, and pathologic findings from the Surgical Laboratory of the Washington University Medical School, by Dr. F. H. Staley.

CASE 1. The patient, a girl 17 years of age, was referred to me by Dr. A. H. Hamel and the eye condition was observed incidentally while she was under treatment for ankylosis of the jaw.

HISTORY. When 7 years of age the child was struck by an automobile receiving a gash across the forehead, and an injury to the point of the chin, followed by an ankylosis which the reporter relieved by operation in December, 1915, when the patient was 13 years of age.

In January, 1915, following an attack of tonsillitis, the left eye became prominent for ten days and then receded. In July of the same year a painless prominence was again noticed, and a lateral hemiopia gradually developed as the eye protruded farther. The palpebral fissure enlarged, the sight gradually became worse until at the time of operation the patient could see only to one side with the left eye.

In April, 1919, there was some pain above and to the side of the orbit. There was a small nodular goiter of the left and

middle lobe and the patient was given iodides and thyroid extract by her family physician but without any change in the exophthalmos. Two Wassermann examinations were negative.

EYE FINDINGS. October, 1915. By Dr. A. Collasowitz. Right eye vision = 20/30; with 0.50 at 90° = 20/15. Fundus normal. Left eye vision: 1/40, with +6.00 = 20/50. Fundus: Some edema of the optic nerve head; retinal arteries narrow; veins engorged: picture of impeded circulation. Exophthalmos marked. Eye cannot be pushed back into the orbit. Probably part of the orbital wall is being pushed inward by exostosis.

November, 1915. Left eye less prominent; no change in fundus picture; counts finger at 14 feet.

October, 1916. By Dr. A. E. Ewing. Right eye, V. = 20/20; left eye, V = 20/38. Right eye, pupil normal, readily responsive to light. Left eye, pupil normal in size, reacts feebly to strong light; reacts to accommodation and convergence. Exophthalmos about 5 mm. Width of palpebral fissure 12 mm. Oph-

thalmoscope: Media and fundus normal, both.

July, 1919. Left eye V. = 3/192, not improved. Ophthalmoscope: Possibly slight enlargement of the veins of the fundus, disc a little pale. Pupil 5 mm. in diameter in lamplight and a little irregular in outline; normal in size in bright light, responds feebly to strong light, readily to accommodation and convergence. Palpebral fissure 12 mm. wide.

Exophthalmos 5 mm. The eye turns a little outward and downward. Normal movement nasalward in near fixation, but

there is a tendency to diverge in distant fixation. Marked tenderness in the upper nasal portion of the orbit.

X-RAY EXAMINATION showed no bony growth or deformation of the orbit.

PREOPERATIVE DIAGNOSIS. Slow-growing connective tissue or nerve tissue tumor.

OPERATION (Dr. Blair) July 28, 1919, at Barnes Hospital under ether anesthesia. An incision was made around the orbit from the external angular process to above the upper border of the zygoma, then backward and down-



Fig. 1—Case 1. Exophthalmos due to fibrous tumor of optic nerve. Side view July, 1919.

ward to the middle of the zygoma thru all the tissues, the orbital incision being continued around the outer third of the lower border of the orbit thru the skin and superficial fascia only. The outer wall of the orbit was resected and the external rectus was cut near its insertion. A tumor almost 2 cm. across was found extending from the apex of the orbit and attached to the posterior surface of the globe over an area of $\frac{1}{2}$ inch in diameter. When dissecting the

tumor from the back of the globe, the sclera which seemed to have almost disappeared, was opened. The optic nerve was cut posteriorly with scissors. On section the tumor showed the optic nerve in its substance for $\frac{1}{4}$ inch posteriorly. In closing, the rectus was repaired, the orbital periosteum was brought together and the bone held in place by a periosteal suture. The wall was closed with a small drain. Fine silk was used thruout for suturing and ligating.



Fig. 2—Case 1. Front view July, 1919.

DIAGNOSIS: Neuroma of the Left Optic Nerve.

PATHOLOGIC REPORT by Dr. F. H. Staley. *Gross Pathology:* The specimen consists of a soft, elastic, encapsulated, fusiform tumor which measures 3 cm. by 2.5 cm. by 2 cm. It presents a yellowish-red color. On one aspect is a circular defect in the capsule which is slightly raised above the general curvature. On section the cut surface is smooth with a yellowish tinge but darker and more nearly gray than normal fat.

The consistency of this tumor is firm but not stony hard like carcinoma.

Microscopic Pathology: The matrix of sections taken from several regions of the tumor is fibrillar in character. The fibrils are dense in certain areas where they are arranged in whorls. The main body of the tumor, however, has a matrix composed of fibrils loosely arranged with definite spaces intervening. These spaces may be due to edema. In the areas where the fibrils are dense they are seen to react to the van Gieson stain as



Fig. 3—Case 1. Results of removing tumor by modified Kroenlein operation. The tumor adhered to eyeball over an area of 12 mm. in diameter. In removing it vitreous was exposed thru an opening 3 mm. across. Healed without shrinkage of globe. Normal closure of eye.

do the fibrils of white connective tissue. Two types of cells are seen in the tumor. The first type corresponds to a glia cell with fibrils containing a considerable amount of chromatin. The second type resembles a fibroblast. Each cell type seems to retain a uniform size. Numerous small vessels with irregular thin walls course thru the tissue. In some places they are simply sinuses lined by endothelium alone. Nerve fibers are seen to traverse every part of the tumor. There are a few small areas appearing

hyalin in nature. There is no infiltration with leucocytes.

POSTOPERATIVE FINDINGS by Dr. Ewing, September, 1919. O. S. No exophthalmos. Deviation inward 4 mm. Mobility unimpaired except in sphere of action of the external rectus. Pupil 5.5 mm. in diameter, does not react to light, reacts readily to accommodation. Disc pale, vessels of disc and retina small but not obliterated. Vision = 0. To the nasal side and above the disc is a large floating grayish-white mass, which has



Fig. 4—Case 1. Result of removing tumor. Internal strabismus due to a failure of union of external rectus tendon. The eyebrow, which was very high before operation, has not quite returned to normal position.

the appearance of an absorbing exudate; it moves in the vitreous but returns to its original position.

June 29, 1920. Right eye conditon unchanged. Left eye pupil 3.75 mm. in diameter, a trifle larger than its fellow. $V = 0$. Palpebral fissure 9 mm. wide (same as right). Disc very pale, vessels of fundus smaller than normal, floating mass persists, is now bluish-gray in color; extending horizontally across the nasal portion of the fundus to the nasal side is a delicate gray shred; in the nasal portion of the fundus are small, old retino-

choroidal atrophic spots. The eye deviates inward 3 to 4 mm.

CASE 2: HISTORY AND FINDINGS by Dr. R. P. Scholz. Dr. N. M. Freund referred the patient, a woman aged 31 years, giving the following history: As a child she fell upon a pocket knife which penetrated the outer portion of the orbit. For several days there was swelling of the orbital tissues but within a very short time the tiny wound healed and the swelling subsided. As time went on, the sight gradually became impaired, there was divergence and ptosis. She suffered



Fig. 5—Case 1. The position of the incision. On the solid line it goes thru all the tissues down to the periosteum; on the dotted line it goes to, but not thru, the orbicularis palpebrarum muscle.

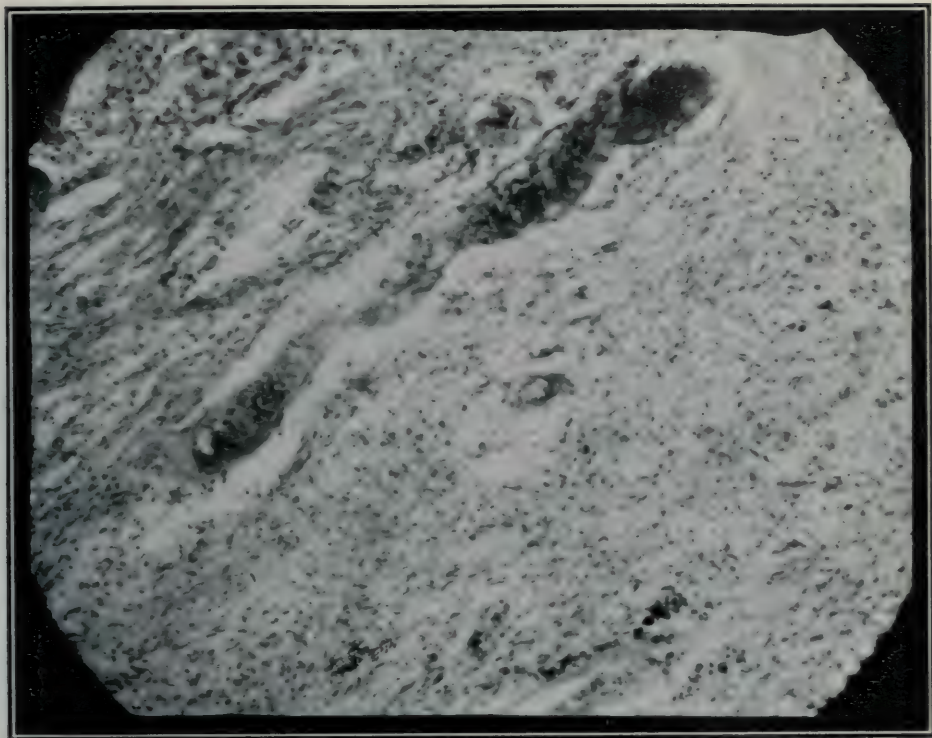


FIG. 8.—BLAIR'S CASE I: SECTION THRU PERIPHERY OF TUMOR. THE CELL TYPE CORRESPONDS TO THE GLIA CELL WITH FIBRILS. VESSELS WITH THIN WALLS.

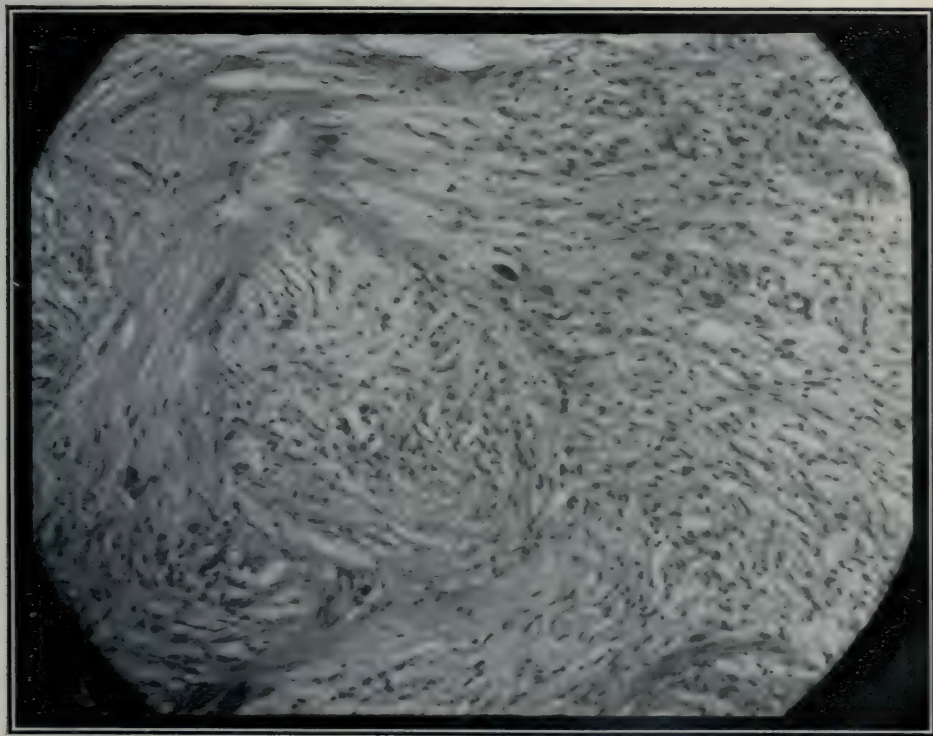


FIG. 9.—BLAIR'S CASE I: SECTION THRU THE MAIN BODY OF THE TUMOR. FIBRILS ARRANGED IN WHORLS. SOME ARE OF WHITE CONNECTIVE TISSUE, RESEMBLING FIBROBLASTS. NOTE SPACES BETWEEN FIBRILS.

from right-sided headache which in the beginning was of several days duration, but later the attacks lasted three to four weeks. A very marked and annoying photophobia developed at these times. Within the past ten years the patient underwent three or four operations on the eye for the purpose of correcting the deviation of the eye. Four years ago she met with an automobile accident, sus-

taining further injury to the right side of the head, following which the symptoms became more pronounced.

Three weeks previous to my first visit she apparently contracted a cold which was accompanied by profuse nasal discharge, nasal obstruction, occipital, parietal and frontal headaches on the right side, pain about the right eye and over the right maxilla. Morphin, of which

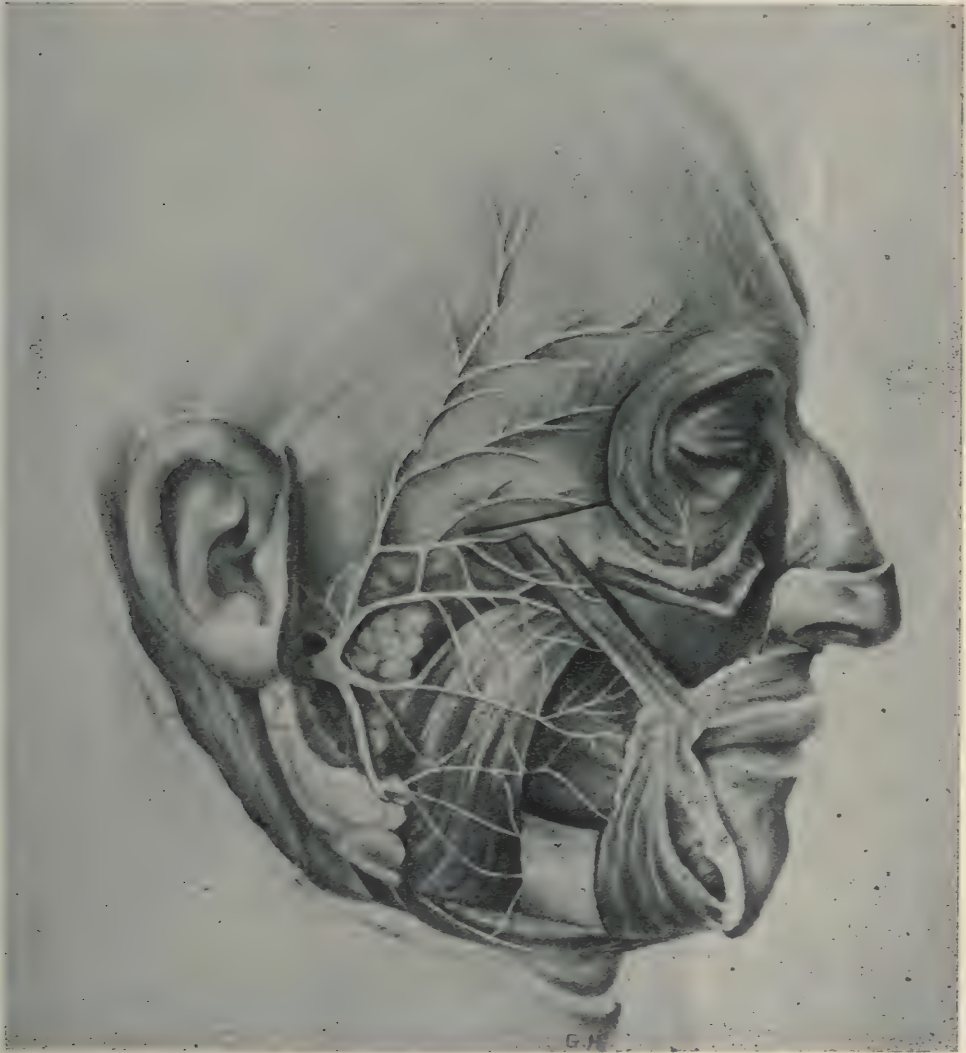


Fig. 6—Case 1. Relation of seventh nerve to orbicularis and zygoma, and incision used in the operation. Solid black line, incision carried down to the periosteum. Outlined flap was dissected upward from periosteum and temporal fascia. Along the dotted line the incision was carried down to, but not thru the orbicularis palpebrarum muscle. By retraction with sharp retractors sufficient room was obtained to resect outer wall of orbit, leaving the bone attached to temporal fascia, and to display contents of orbit. The incision was planned to do least damage to nerve supply of orbicularis. (Figure from Spalteholz' Hand Atlas of Human Anatomy.)

the patient had taken large doses in the past, was required to quiet the pain.

Nose: Nasal mucous membrane congested, deep pink in color. A profuse serous discharge. Nasal passages patent. Septum fairly straight. After thorough shrinkage of the tissues I was unable to

in one of the accidents or operations, she was sent to the roentgenologist.

X-RAY FINDINGS by Dr. M. B. Titterington. Knife blade about $\frac{3}{8}$ inch wide and $2\frac{1}{2}$ inches long in the right orbit, just behind the outer border with the point under the anterior clinoid process.

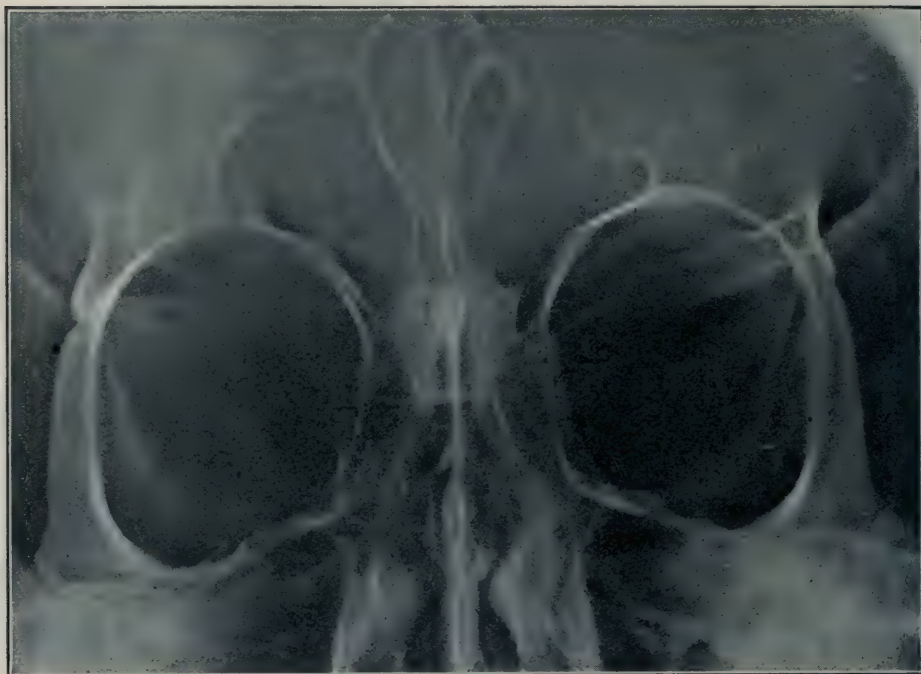


Fig. 7—Case 1. X-ray appearance of the orbits in Case 1. With stereoscope no enlargement of left orbit could be made out. The tumor rested against apex of orbit and posterior surface of globe; and caused exophthalmos, but no lateral pressure. Drawing made on light negative print attempts to reproduce picture obtained with the stereoscope. The left orbit is to the observer's left.

find the slightest macroscopic trace of pus. No hypertrophic tissues visible. Olfactory fissure free. Sphenoidal foramen patent.

Mouth: Upper teeth on the right side missing. Postrhinoscopic examination failed to reveal pus or hypertrophic tissue. Tonsils very small and buried. Two days later a more extensive examination failed to add anything of importance to the first. Transillumination showed perfect symmetry in the illumination of both antra. Feeling that there was some sinus involvement of a doubtful nature, or that possibly a tooth had been displaced upward into the antrum, or that the relationship of the parts had been disturbed

There may be some absorption about the blade. The sinuses are apparently not involved with the exception of a thickening of the mucous membrane in the maxillary sinus. There is a small piece of the root of the tooth under the bridge work.

EYE FINDINGS by Dr. John Green, Jr. As the presence of the knife blade in the orbit was not suspected, the patient did not receive treatment by an oculist at the time of the injury. The operation performed by my predecessor was an advancement of the right internal rectus. The eye was brought into better position but still showed 20° divergence. No operation on the upper lid. Has incomplete

ptosis and paralysis of the superior, inferior and internal recti muscles.

Right eye has a little patch of field downward and outward.

R. V., counts fingers excentrically one foot. L. V. 6/5. There is a small vertical linear scar running downward from

The anterior end of the knife blade was found lying $\frac{3}{4}$ of an inch behind the outer border of the orbit, was easily grasped with forceps and withdrawn intact. The wound was closed with drainage.

The patient had an even convalescence



Fig. 10—Case 2. X-ray showing knife in right orbit and middle fossa of brain. Produced like Fig. 7.

the outer angle about 1 cm. which no doubt represents the point of entrance of the knife blade. The cornea is faintly nebulous. The iris is tremulous. Ophthalmoscopically the right eye shows almost complete optic atrophy. Left eye normal.

KROENLEIN OPERATION (Dr. Blair) Nov. 6, 1919, at St. Luke's Hospital. Under ether anesthesia, an incision was made along the outer third of the brow around the orbit to above the upper border of the zygoma and then backward and downward to the middle of the zygoma thru all the tissues, the orbital incision being continued around the outer third of the lower border of the orbit thru the skin and superficial fascia only.

with some swelling of the upper lid, and chemosis of the conjunctiva. Boric eye wash and vaseline to the chemotic conjunctiva.

November, 1919. The patient has "bunch" of pains and sensations around the new scars, but none of the old pains, and can distinctly raise the right eye lid when she elevates the left one. She was instructed to practice before a mirror.

January, 1920. Some feeling of numbness and lack of power on effort in hand and feet. Practically comfortable as to headaches and pain in teeth. The scar is still tender.

March, 1920. No pain or ache of any kind.

THE PHYSIOLOGY OF ACCOMMODATION IN THE EYE OF THE BIRD.

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This paper, from the Physiological Laboratory of Stanford University, reviews previous discussions of this subject, gives an account of the parts concerned in accommodation, and reaches the conclusion that in birds this is accomplished by movement of the refracting media along the axis of vision, rather than by changing the curvature of the surfaces. In this it resembles focussing with the camera, rather than focussing with the human eye.

Any one who has ever watched the flight of birds in woods and among shrubbery, no doubt marveled at their ability to avoid collision with the various large and small objects which lie in their path. The rate of flight varies with different species from thirty to eighty or ninety miles per hour. This means that to avoid colliding with the various objects in their course, or to catch insects on the wing, they must see them distinctly, not only in rapid succession but also within a small fraction of a second and react to this stimulus.

This requires a mechanism (1) capable of quick changes of focus for clear vision, and (2) for rapid adjustment to the very quick modifications of light varying from bright sunlight to deep shadow. The first mechanism consists of a set of ciliary muscles, called in the bird Crampton's muscle, which act upon the lens. The second consist of two sets of muscles, the sphincter pupillae and the dilatator pupillae, which vary the diameter of the pupil. This arrangement is similar to that found in the eye of man.

Man is a relatively slow moving animal and there is no need for the rapid adjustment found in the bird. The muscles which actuate these changes in man are of the smooth variety and therefore are necessarily slow in action. Smooth muscles in the eye of the bird would act too slowly to prevent its collision and death, and to enable many of them to secure their food. Here we find these structures composed of the quick acting striated muscle fibers. This is an important distinction in the accommodation apparatus in the bird as compared to that in mammals.

Accommodation in the eye of the bird is not only accomplished more rapidly than in mammals but also, according to my evidence, in a wholly different manner. In both classes of animals when the eye is at rest it is accommodated for distant vision. Near vision is brought about by the contraction of the ciliary muscles.

There are two ways in which accommodation may be achieved: either by a change in the curvature of the lens, or by shifting the location of the lens forward and backward along the axis of vision similar to focusing a camera. In man the generally accepted theory is that accommodation for different distances is accomplished by changes in the curvature of the lens. That is, in far vision the lens is more flattened than in near vision. This flattening is due to the elastic wall of the eye exerting a pull on the suspensory ligament of the lens. In accommodating for near objects the contraction of the ciliary muscle reduces this pull on the suspensory ligament, and the lens, due to its elasticity, assumes a more spherical shape.

The bird lens differs not only in shape but also in structure from that of mammals. It consists of a very firm almost spherical central portion, the lenticular portion, completely surrounded in the equatorial region by a mass of lenticular cells forming a structure very similar in shape to a wedding ring. This has been designated by Rabi² the "ring-wulst." I have called it the annular pad.

This annular pad is composed of more or less radially arranged nucleated cells, extending from the periphery to the inner margin of the pad. The annular pad is more or less separated from the more

dense and spherical lenticular portion by a space filled with fluid. This space, which I have called the lenticular cavity, conforms to the shape of the lenticular part. In cross section it resembles somewhat the shape of a comma. The broader portion is located posterior to the equator of the lens. It gradually becomes narrower toward the front and disappears a short distance anterior to the equator.

With this exception the annular pad lies in direct contact with the lenticular part of the lens, tho apparently not firmly attached to it. The line of junction thruout represents the original inner surface of the lens vesicle. This loose connection between the annular pad and the lenticular portion accounts for the latter dropping out so easily in making sections of the lens.

The lenticular cavity is also situated at the line of junction of the posterior and anterior walls of the original lens vesicle. In the development of the lens, however, the original cavity of the vesicle is entirely obliterated by the growth of the posterior wall and it is not until toward the end of development that this cavity begins to appear, due apparently to a secretion from the cells of the annular pad.

The functions of these two portions of the lens in the bird are, in my opinion, entirely different. The central part undoubtedly functions in changing the focus. I doubt whether the annular pad takes any part in the act of accommodation. The cells composing it appear more like secretory cells than true lens cells. In sections numerous granules are seen in them and numerous coagulated masses are observed extending from their inner ends into the lumen of the lenticular cavity.

From this I conclude that the annular pad is secretory in function and serves to furnish at least a part of the nourishment for the true lenticular portion. The large conspicuous nuclei and the numerous granules would greatly interfere with clear vision thru this part. Furthermore, the size of the pupil is such as to practically exclude all rays of light except those which pass thru the lenticular portion.

Different views have been advanced in regard to the manner in which accommodation is performed in the bird. Some authors maintain that it is due to a movement of the lens forward and backward while others, trying to homologize this process with that in man, claim it is accomplished by changing the curvature of the lens.

One view which has been advanced is that the pecten plays an important part in accommodation. The advocates of this theory claim that changes in the intraocular pressure are caused by variations in the amount of blood in the pecten. Increased intraocular pressure would push the lens forward and a decrease allow it to move backward. The rate of change in accommodation is so rapid, that in my opinion, this theory is wholly inadequate.

Exner² and Beer⁴ state that the anterior insertion of Crampton's muscle is to the inner lamella of the cornea. When it contracts it exerts a pull on this part and causes a backward movement of the periphery of the cornea causing increased curvature of the anterior surface. They claim this decreases the tension on the ligamentum pectinatum and allows the lens, due to its elasticity, to become more spherical. The increase in curvature of the lens was greater on its anterior surface. When Crampton's muscle relaxes, the elasticity of the wall of the eye causes it to resume its former resting position, causing a strain to be again put on the ligamentum pectinatum which results in flattening the lens.

Hess⁵ has corroborated the above theory in his study of the cormorant eye. This bird has a wide range of accommodation, since it can pursue and catch its prey under water as well as see distinctly in the air. Hess, making use of nicotin, hardened the eyes under varying degrees of accommodation. By this method he claims to have demonstrated marked changes in the curvature of the lens, especially of the anterior surface.

In hundreds of sections which I have made of different individuals of the English sparrow killed under varying conditions I have been unable to demonstrate any change in the shape of the lens other than that due to age. This change

consists of a variation of the ratio of the axial to the equatorial diameter of the whole lens. In the young sparrow, soon after hatching, the ratio of the axial to the equatorial diameter is as 1:1.4; at the age of the first flight it is 1:1.467; in the adult it is 1:1.575 respectively. This change in ratio is mainly due to a relatively greater increase in the thickness of the annular pad. Furthermore the axial diameter and the equatorial diameter of the lenticular part maintains practically a constant 1 to 1 relationship.

I feel confident, therefore, that in this species accommodation is not performed by changes in the shape of the lens. A study of a large number of sections of other species leads me to conclude that the same is true in them. If the lens does change its curvature the spherical shape of the lenticular part would be an adjustment for near vision. According to the theories advanced this is due to contraction of the ciliary muscles. It is a generally conceded fact that in death the muscles generally assume a relaxed condition. The elasticity of the wall of the eye, which is unaffected by death, would therefore cause the lens to be hardened in a flattened condition and would be demonstrated in any section of the lens. This seems to me definite evidence that there is no possible change in the shape of the portion of the lens which functions in accommodation.

I have not had the chance of examining the eye of the cormorant and can therefore not comment on the findings of Hess. The lenticular part of the lens in all birds examined, however, is so firm and compact that the force required to change its shape would be far greater than that which the ciliary muscles could exert. Furthermore, the only attachment of the lens is to the ciliary processes at the annular pad. Since this part of the lens is very loosely attached to the central portion a pull of sufficient force to flatten the latter would cause a separation of these two parts of the lens before any change in the shape of the firm center could occur. I doubt therefore whether any bird is able to change the shape of the firm lenticular portion of the lens. At least I have no evidence of such a change.

Since there is no evidence of a change in the shape of the lens in the sections at hand, how then is accommodation accomplished? The sections do show change in shape of the eyeball which modifies the axial diameter. That is, the ratio of the axial diameter to the equatorial diameter of the eye varies from a 1:1.048 relation to a 1:1.287. This is a variation of about 24 per cent. The most noticeable change is seen in the anterior portion of the eye. In other words I maintain that near and far objects are brought to a focus on the retina in a manner similar to focusing a camera. That is, by a shifting of the lens and cornea forward and backward.

The amount of movement of the lens and cornea required to change the focus from ten millimeters—the nearest probable distance—to infinity is less than one millimeter. The 24 per cent variation above mentioned is greater than is required to bring about this small movement of the lens and cornea. This movement is accomplished not by changes of intraocular pressure brought about by variations in the amount of blood in the pecten, but by the ciliary muscles modifying the curvature of the wall of the eye; which results not only in increased pressure on the vitreous humor but also in forward movement of the cornea and the lens.

The mechanism for this consists of the arrangement of the fibers of the ciliary muscles in the anteroposterior direction, and of a reinforcement of the elastic wall of the eye in this region by the bony, or scleral plates. The anterior attachment of the ciliary muscles is to the inner wall at the periphery of the cornea. Posteriorly this muscle terminates in a tendon which is attached to the inner surface of the sclerotic coat a short distance back of the scleral plates. This has been previously mentioned.⁶ Leuckart⁷ and others claim that the posterior attachment of the ciliary muscles is to the choroid.

In hardening eyes for sections thru the whole organ numerous artefacts often occur. One of the most frequently noticed is the separation of the choroid from the sclerotic coat. In

some of my sections such a separation occurred in the region of the posterior attachment of the ciliary muscles. If this attachment were to the choroid it would have remained fixed to this structure and would have floated off with it. But such is not the case. The choroid separated in some cases so that a wide space exists between it and the sclera. In these cases the extreme posterior end of the tendon of the muscle is seen still attached to the sclera. Farther forward from this point there seems to be a firm union to both sclera and choroid for the tendon has been longitudinally split or torn apart leaving a portion attached to each of these coats. One would naturally conclude that separation would occur at the place of least resistance. If this conclusion is true then the extreme posterior attachment is to the sclera. Anterior to this the muscle would exert a pull on both the sclerotic and choroid coats as it seems to be here attached firmly to both.

The wall of the eye in the region of the ciliary muscles bends slightly inward. The bony plates which are imbedded in the sclera in this region also bend to conform to the same curvature. The muscles, extending in a forward and backward direction, are arranged longitudinally over the convex inner surface of this bend. Since their two ends are united to the sclera, when contraction occurs the strain would tend to straighten out this curvature and increase the intraocular pressure in the vitreous chamber by reducing the equatorial diameter of the eye. The wall of the eye is prevented from buckling when under this strain by the bony plates. This would result in pushing the whole front of the eye including the lens forward. This act would be an accommodation for near vision. When the muscles relax the strain is removed and all the parts spring quickly back to the resting position due to the elasticity of the reinforced sclera. In this condition the eye is adjusted for far vision. The various degrees of bending of the scleral plates and the varying ratio of axis to equator in different sec-

tions indicate that such a change as described above does occur.

The following experiment furnishes further proof of the above mode of accommodation. A sparrow was anesthetized and its ciliary muscles stimulated by an interrupted Faradic current. The electrodes were applied to the eye in the region of the ciliary nerve plexus. Each time the stimulus was applied all the ciliary muscles were thrown into tetanic contraction. With each stimulus the cornea, iris, and lens moved very noticeably forward producing a slight increase in the curvature of the cornea. Since the lens is practically a sphere, very little movement of it would be necessary in the act of accommodation. This movement of the lens accompanied by the change in curvature of the cornea constitutes, in my opinion, the manner in which accommodation is accomplished in the eye of the bird.

SUMMARY.

1. The eye of the bird is adapted to rapid changes of focus and light conditions.

2. This rapid adaptation is due to the fact that the ciliary muscles and the muscles of the iris are composed of striated instead of smooth muscle fibers as found in mammals.

3. The lens of the bird is composed of two parts; a firm almost spherical central part, the lenticular portion, and an equatorial part, the annular pad.

4. The lenticular center and the annular pad are very loosely joined and are partly separated by a space, the lenticular cavity, filled with fluid.

5. The lenticular part functions in accommodation. The presence of granules and conspicuous nuclei in the cells of the annular pad would greatly interfere with this part functioning as a lens. Its function appears to be that of nourishing the lenticular part rather than that of sight.

6. The size of the pupil prevents rays of light from passing thru the annular pad.

7. There is no evidence in numerous sections of the sparrow of a change in

shape of the lenticular part of the lens. Any force sufficient to change the shape of the firm center would doubtless cause a separation of the two loosely connected parts before accomplishing the change.

8. The lenticular part of the lens maintains practically a 1 to 1 relationship in regard to its axial and equatorial diameters.

9. There is seen a change in the ratio of the axial to the equatorial diameter of the eye. It varies from 1:1.048 to 1:1.287 respectively. The first represents adaptation for far vision, the second for near vision.

10. It is proved experimentally that the front of the eye moves forward when the ciliary muscles contract.

11. The amount of movement required is but a fraction of a millimeter. The change in the axial diameter of the eye is sufficient to produce this movement.

12. Accommodation in the bird eye seems to be accomplished by movement of the refracting media forward and backward along the axis of vision similar to focusing a camera rather than by a change in the curvature of the lens.

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THE FUNCTION OF THE PROTEIN IN THE LACRIMAL SECRETION.

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Collateral and experimental evidence is here correlated to show the important functions performed by the protein content of the tears, in regulating the proper interchange of fluid in the cornea. Absence or impairment of the film which normally covers the cornea may favor the development of serious pathologic conditions.

Today Medicine is seeking an explanation of morbid phenomena in pathologic physiology. A review of eye diseases suggests an incomplete understanding of the etiology of pathologic processes apparent there in the anterior segment.

Histologically the lacrimal glands are serous like the parotid (Stewart¹). They are simultaneously involved in Mikulicz's disease. The smaller glands (known as Krause's) contained in the conjunctiva resemble the lacrimal in structure (Fuchs²). The characteristic feature of a serous glandular secretion is albumin and we find it present in the lacrimal fluid. Hammarsten³ (quoting Lerch) states the tears contain 5 parts per thousand albumin. A study of the properties of albumin and

globulin is the basis of the following concept.

Protein is a strongly hydrophilic colloid. To Hofmeister (Mathews⁴) we give credit for recognizing and studying its property to absorb water. He found that water is absorbed with great quickness. That the swelling is in proportion to the surface. That salt in solution increased the swelling power. These properties have been found true when acting thru a semipermeable membrane. For example 10 cc. of egg white, acting thru the egg membrane reinforced with collodion and immersed in distilled water, swelled to a volume of 27 cc. in 24 hours. The same amount swelled to 28 cc. in 24 hours when immersed in 1.4% solution.

For accuracy the egg white and lacrimal gland secretion will be referred to as protein, as both contain albumin and globulin.

The salt solution retards the swelling at the outset. In the first two hours the swelling amounted to 2 cc. when placed in the water, whereas 2 cc. was not absorbed until 2 hours and 20 minutes when placed in the salt solution. This is explained on the basis that the osmotic pull of the salt solution resisted the swelling of the protein, but the salt soon diffuses over into the protein and not only neutralizes its own osmotic pressure but further augments the swelling power of the protein. The most striking and probably the supremely important property of the salt is that it effects the transparency by dissolving the globulin.

To ascertain the relation of surface to rate of absorption, two pieces of equal size were cut from a sheet of parchment paper and folded into a funnel shape. One was plicated, using the entire surface, while the other was folded in the common way and only $\frac{1}{4}$ of the surface was utilized. Ten cc. egg white was added to each, and both partly immersed in .5% salt solution. The first absorbed 5 cc. in 17 hours, the second $2\frac{1}{2}$ cc. in the same length of time.

The cornea is semipermeable, of which a common proof is the miotic and mydriatic effects of drugs instilled in the conjunctival sac. Further proof is demonstrable if an eye is sectioned, eviscerated and placed in egg white with the cornea in contact with the protein. Now if water is placed in the eye, the protein in contact with cornea will cloud and become opaque, showing water absorption thru the cornea and precipitation of the globulin. Similarly if the eye is placed in distilled water and salt solution is placed in the eye the salt very quickly penetrates into the water.

A protein fluid is secreted by the lacrimal and allied glands in the conjunctiva, and spread out on the corneal and conjunctival portions of the eye by the action of the lids. This is evidenced in the living eye when a particle of dust

is caught in the surface of this film, and shifts about with every slight tremor of the lids. Its edges are frequently visible when removing foreign bodies from the cornea. The globulin content is precipitated when a drop of water is instilled. This film is apparent at death for then it coagulates and loses its transparency. In thickness a rough estimate places it at .1 to .2 of mm. Such a film would swell to its maximum in a few minutes (Mathews⁶). Protein solutions in the presence of 1.3% salt retain their transparency except for a bluish tint which represents a diffraction of these rays and is known as Tyndall phenomenon. Tears thus have a sparkle like a diamond.

The aqueous humor is secreted by the uveal epithelium (Stewart⁸), and is contained under a pressure of 20-40 mm. of mercury (McLean⁷). It is characterized by a marked deficiency in proteins (Stewart⁸) and is stated to contain 1.4% salt in solution (Berry⁹). Its salt content is seen to be practically that in tears. Such a salt solution has a freezing point of .85 (Kosaki¹⁰) and osmotic pressure of 10.25 atmospheres (Harris & Gortner table). The positive pressure in the eye reduces this osmotic pull somewhat. In the egg experiment it resists protein swelling only slightly at the outset, in comparison with distilled water. This pressure comes into play, however, in instilling drops in the eye.

As the film absorbs salt it also absorbs water from the aqueous, goes into solution and is drained off thru the lacrimal ducts. This then is the mechanism of lacrimation and is constantly going on.

Such a concept is supported by clinical evidence and serves admirably to explain the peculiar behavior of many diseases involving the anterior chamber and cornea. For example:

In conjunctivitis xerotica the patients are unable to weep altho they feel a fullness in the eyes (Fuchs¹¹). Arlt's explanation, while founded on a single case, fails to account for the fullness in the eyes. The cornea is no longer a permeable membrane and consequently lacrimation is impossible.

In annular abscess in all probability the infecting organism, introduced into the anterior chamber, is carried by the outward current to the center of the posterior concavity of the cornea, and there expends its toxic action.

Corneal ulcers of the serpiginous type may find an explanation of their spreading tendency by the presence of the protein film maintaining the organism in apposition to the cornea.

We have a very satisfactory explanation of glaucoma in the application of this concept of lacrimation. Excised glaucomatous eyes have an aqueous that is sufficiently albuminous to coag-

ulate readily in the air (Fuchs¹²). The presence of the albumin in the aqueous in fact gives the disease its name (sea green) in the diffraction of the light rays (Tyndall phenomenon); and also accounts for the haloes about points of light which these patients experience. The presence of the albumin in the aqueous largely destroys the function of the film on the cornea, and leaves only the venous channels to supply drainage. Not only that, but with its hydrophilic propensity reenforced in the presence of salt it rapidly absorbs water, increasing the contents of the globe.

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BLOWS UPON THE EYEBALL IN THE REGION OF THE CILIARY PROCESSES: THEIR MEDICO-LEGAL ASPECT.

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The importance of some knowledge of the early symptoms and course of these cases before passing judgment is here pointed out. Especially is this true where disability has been caused by nerve shock or pain.

I have reference to blows upon the eyeball, hitting and affecting a very limited area of the sclera in the region, to the inner surface of which are attached the ciliary processes.

I shall give several cases which will exemplify what I mean.

The first case was that of a young man, who while pigeon-shooting was struck on the eye by a glancing pigeon-shot. This one shot was deeply imbedded in the sclera. It was lying in situ, but when removed, which was easily done, it had so penetrated the sclera, that the dark coloured ciliary processes could be seen at the bottom of the deep depression.

The symptoms, which caused me to be summoned twelve hours after the accident, were a semiunconscious condition, wandering of mind, decided dread of light. The next day after the removal of the shot, I examined the eye and found the media quite clear, and no signs of the blow in the interior of the eye. The vision was normal. In two months' time his eyes could be freely used, a marked contrast to the other cases to be given.

The next case that I shall mention is a typical one of the kind that I wish to draw your attention to, and which has Medico-Legal bearings of interest.

My patient was an influential official of a large bank. He was walking along the street at night, when a man coming up at his side, struck him a severe blow upon his eye. The object was robbery. The next morning he came to consult me. Externally there was swelling and discoloration of the eyelids. The vision was normal, and the media quite clear. No external mark on the eyeball of any kind was to be seen, but at one spot of the ciliary region extreme tenderness upon the slightest pressure

with no external evidence to show its position. He was in a thoroly dazed condition. This tender spot caused him continuous pain. I sent him home, and had ice applied locally, and atropin solution dropped into the eye thrice daily; and also complete rest in a darkened room, as the photophobia was severe; sodium bromid internally.

The shock to the nervous system was so great, that I kept him in bed for three weeks. At the end of that time the tender spot was still constantly felt, and any direct pressure caused marked pain, tho elsewhere upon the eyeball a normal sensation only. At the end of one month, I stopped the atropin drops, as there was no sign of any disturbance of the eye whatsoever either externally or internally, and the vision was normal.

However, after the effects of the drops had gone any attempt at reading caused decided pain and had to be given up. This was evidently due to the bruised condition of the ciliary processes and the corresponding sclera, showing how sensitive the injured spot still was.

I kept him in partial disability for three months after this date, on that account. At the end of this time, if he used the eyes freely, he felt this eye quite uneasy, which, however, gradually became less and less.

Now the following procedure brings out the medico-legal aspect of these cases quite plainly. As the agent of the accident insurance company wished the partial disability stopped before the time I named, he, of his own accord, sent my patient to another specialist. This oculist upon examination, finding the eye quite quiet, media clear, vision normal, and absolutely no sign of any injury, either without, or within

the eyeball, decided that the patient could resume his full duties. He told him so, saying that there was no sign of any trouble, and that he could see well. My patient replied, at the very first there was no injection or any sign of disturbance of the eye itself, tho the suffering was at times severe. The vision, he also told him, had remained unaffected thruout.

The agent reported to me, and so did my patient. I at once answered the agent, that my patient would remain under partial disability as I did not agree with the opinion of the oculist. Thus you see, the oculist felt that he saw no reason, even after a careful examination why he should not give the eyes full work, as the eye seemed normal in every way. But, so it was at the first, and the only local signs of the blow, were the darkened and swollen lids.

This is a very interesting case, and my patient's position puts him above any suspicion.

About this time—that is three years ago—I had two other similar cases, in which the symptoms and appearances were exactly the same. In these also several months had to elapse before even ordinary use of the eyes could be born.

To the oculist who first sees the case the course that it follows is recognized

and understood. However, the mistake made by the oculist who saw it two months later, was to the first oculist very natural—if the second were guided by appearances only. This error of his, resulting from being guided by appearances solely, can be avoided by a careful examination of the history of the accident and the knowledge how these cases act, derived from practical experience.

In patients who have an object in remaining idle, the time for resumption of full duty can be deduced from the condition present at the time the injury was received, and from decisions derived from the experience of others.

Therefore the opinion of an oculist consulted for the first time, at the end of—say two months—as to whether the eyes can be freely used is of little or no value, if the decision be based only upon the condition noticed by the second oculist, as previously mentioned.

Here lies the medico-legal point, which should be fully realized. The second oculist should not only say what he sees on examination, i. e. that the eye is apparently normal: but also in order to diagnose correctly, should always have full knowledge of the history and of the peculiarities attendant upon these cases. Moreover, if these latter be omitted, then the opinion regarding the fitness of the eye to be used freely, is rendered almost valueless.

REPORT OF CASE OF RETINAL GLIOMA TREATED WITH RADIUM

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This paper reviews the unfavorable prognosis for bilateral glioma as set forth in the literature, and the earlier accounts of the use of radium for it. It emphasizes the importance of reporting every case so treated with the dosage as determined by the amount, time, and screening of the radium used. It then reports a case showing the dosage used and the reaction observed, the progress of the case being thus far favorable. Read before the Sioux Valley Eye and Ear Academy, July 14, 1920.

The purpose of reporting this case to this meeting is not to bring before it any remarkable result, but rather because I have been deeply interested in the subject and because I am very desirous of learning the experience of men older in ophthalmology than myself, and on my return, of giving the

patient, who is still under treatment, the result of such knowledge.

When the patient, whose case history I will read later, was brought into my office, I was confronted with this problem. A bright, apparently perfectly normal, male child of one year with good central vision, right, no

signs of trouble left, with the exception of the yellowish pupillary reflex. The mother had noted since three months of age a peculiar light pupil in the left eye, but the patient had been otherwise an apparently normal child until about four weeks from the time when the case was first seen by myself, when the yellowish reflex became rapidly much more noticeable. The balance of the physical signs, etc., I will enumerate later, but a diagnosis of bilateral retinal glioma was speedily reached. According to the men of most experience, then, the child's best chance for life was immediate enucleation of both eyes, altho he had good vision right, and exenteration of the orbit if the pathologic report showed extension beyond the bulb; altho the tumors were still in the first stage, i. e. apparently confined within the eye ball and causing no appreciable signs of irritation or increased tension.

On looking up the literature on the subject I was struck by the scarcity of reported cases treated by other than surgical means and of the few cases that I found that had been treated by the X-ray and radium. In the report of cases that I found treated by radium alone, while the dosage as to milligrams and filters was given, the time was not stated. Also in these cases both eyes had been enucleated and the orbit simply treated for recurrences, and I did not know what effect the radium rays would have on the retina itself. In another series the X-ray and radium were used jointly, and it was difficult to tell which was effective and which harmful. With the above problem in mind, the condition was explained as well as possible to the parents. The left eye, which was already practically blind, was at once enucleated, sent to the pathologist, who reported retinal glioma with involvement of the nerve and paraneural sheath. We then had a case with extension already beyond the bulb and either a complete exenteration of the posterior part of the orbit, left, and enucleation of the other eye, or some other form of treatment was indicated.

It might be well at this time to

briefly review the literature of glioma retinae before taking up the case history and treatment of the case in question.

Glioma of the retina, according to Fuchs is the only primary retinal tumor and is essentially malignant. It is a comparatively rare ophthalmologic condition, as Berrisford¹ in a statistical report of 41 cases during the last 42 years at the Royal London Ophthalmic Hospital gives an incidence of 0.01%. As to sex, there is probably a slight predominance in the male, in Berrisford's series, there being 22 cases in males to 17 in females, with six cases in which the sex was not reported. It is unusual to find the condition hereditary but A. Hill Griffith² reports a family with six children in which the mother and three children had gliomas of the retina, and notes eight other examples in the literature besides his own. He states that in hereditary cases there seems to be an abnormal tendency to affect several members of the family and to affect both eyes. No note has been made to my knowledge with regard to any race predilection to the disease. As to age, it is without question one of early life. Curt Adam³ reports 47 cases with 94% under four years of age. Berrisford reports a majority in his series under five years of age. The condition is usually unilateral, Duncan⁴ giving bilateral cases as 15-20%, Owen⁵ less than 25% bilateral in a series from the literature of 552 cases. Berrisford¹ gives the proportion of unilateral to bilateral as 7 to 1.

With regard to the pathology, only cases that are confirmed microscopically are considered. Duncan in a series of cases from the literature, reports 20% of eyes enucleated under a clinical diagnosis of glioma were pseudogliomas. According to Ries,⁶ the glioma develops from embryonic cells and is potentially present at an early stage in the development of the eye. As stated before, the growth has its origin in the retinal tissue and microscopically "is a soft vascular tumor made up of small round, deeply staining cells, many of them containing long protoplasmic processes; they form thick mantels of cells around the thick-

ened blood vessels, the cells between the mantles staining poorly and showing calcareous degeneration. In many of these neoplasms peculiar rosettes have been described by Flexner, Wintersteiner and others, which are composed of elements resembling the rod and cone visual cells and for these growths the term *neuroepithelioma* has been suggested."

A very full description of the minute and gross pathology is given by de Schweinitz⁷, from whom the above is quoted. "The tumor macroscopically is usually of a light gray color and is subject to various degenerative changes—fatty, cheesy and calcareous, and tends on one hand to invade the orbit, involve the optic nerve, and travel by way of its sheath to the brain, and on the other to pass thru the sclerotic and cornea and spread forward." Recurrences are very common after extirpation and usually occur within a short time. According to Berrisford¹ a case which has continued three years without recurrence may be considered cured. The tumor may invade any of the tissues of the eye, it may extend back along the nerve involving the brain or meninges, it may involve the cranial and facial bones or adjacent lymph glands, the before mentioned being the most common sites of extension. It may also involve the parotid, spinal cord, skeletal bones, liver, ovaries, kidneys, lungs and spleen. According to the direction in which the growth takes place it may be divided into *glioma endophytum*, where the vitreous is occupied by the growth, and *glioma exophytum*, where it lies between the retina and choroid.

Clinically, the tumor is classified into four conditions:

1. A blind eye with a yellowish pupillary reflex. "The Amaurotic Cat's Eye."
2. The glaucomatous stage with irritation and increased tension, altho the eye may temporarily shrink, producing *phthisis bulbi*.
3. Growth of the tumor out of the orbit or along optic nerve to the brain.
4. Metastasis and death from exhaustion or involvement of vital structures.

The diagnosis is made clinically, by the history of gradual loss of vision in a child, usually at an early age, by the peculiar yellow reflex of the pupil, often noticed by the parents. There is often a slight or marked increase in tension, especially in the second or irritative stage; and this should be looked for in differentiating from *pseudoglioma*, where the tension may be subnormal. With the ophthalmoscope depending upon the size of the tumor, a yellowish grey mass is seen apparently coming from the retina, wholly or in part filling the vitreous chamber. It must be differentiated from persistence of the posterior part of the fetal fibro-fascular sheath, masses of tubercle in the choroid, inflammatory or purulent effusion into the vitreous, following retinitis or cyclitis, usually with detachment of the retina, and circinate retinitis. *Sarcoma* of the choroid is differentiated by the fact that it usually occurs later in life. In case of doubt, the eye should be enucleated. *Glioma* is never pigmented. Final diagnosis of course is with the microscope.

As to prognosis, early diagnosis is very important, followed by prompt treatment. According to Leber¹ with early enucleation, the tumor being confined within the eye ball it results in 40-50% of cures. Extension without the eye ball renders the surgical treatment practically hopeless. Thus we have a condition where, even if seen in the earliest stage, when confined within the eyeball only, with optimistic reports only 50% survive, and with present methods of treatment, if the growth has extended without the bulb practically 100% mortality. If the surgical treatment is used, especially if followed by exenteration of the orbit, at best we have an otherwise normal child, blind and disfigured for life.

With the above in view, I went thru the literature looking for some other therapeutic measure, for in this case even if I enucleated the eye with the smaller tumor, in which there was still good vision; according to the pathologist I had an extension back along the optic nerve which I could not be cer-

tain of completely removing by an extensive operation.

Axenfeld⁸ in 1915 reported a case treated by the X-ray with favorable results, but his report was not complete. Kusama⁹ reported three cases in detail in 1919, all of which, after nearly total destruction of the eye by phthisis bulbi, ended fatally. In Axenfeld's case, which was bilateral, one eye was enucleated and vision was gradually restored to the remaining eye with the tumor much reduced in size. The tumor was examined at intervals thru a dilated pupil with the patient under an anesthetic. The final result was not given but the treatment had extended over several months. Mesothorium was also used twice for from 12-15 hours, but the amount and filters were not stated. Of Kusama's cases all were bilateral. None of the eyes were enucleated, and two patients were in the second stage and one in the first stage. Both the X-ray and radium were used, the greater dependence being placed on the former. The dosage and technic were carefully given for the X-ray; and the amount and time of the radium, but without the method of filtration or technic of the latter. In all his cases there was gradual shrinking in size of the tumor, but the lashes fell out, the cornea became infiltrated and hazy, the aqueous assumed a reddish hemorrhagic appearance, the pupils and iris obscure, and tension was lowered. The lids became thickened and indurated. All of the eyes went on to phthisis bulbi, metastasis occurred either locally or at a distance and death ensued. The interval between the commencement of treatment and death was, the shortest eleven months, the longest two years.

Rex Duncan⁴ in 1918 reports three cases of retinal glioma treated with radium alone. All three cases were unilateral, in the second stage, when first seen, and all three eyes were at once enucleated. Recurrences rapidly disappeared under the use of radium, not more than three applications being given in two cases and several in the third. The amount used was rather large, the tissues being protected about the recurrences, and the technic as to

filters was given, but not the time of application. The report covered several months, during which there was no sign of recurrence, but a final report was not given.

Of the nonsurgical measures then, radium seemed the most advisable. But the only data that I had was on recurrences when radium was used alone, and I did not know what effect the element would have on the retina if used on an eye in situ. Experiments by Wiedersheim⁷ on rabbits' eyes showed no changes except a slight conjunctivitis when treated with X-ray; and in Kusama's cases it was impossible to tell whether the injurious effects were from the X-ray or radium, but he seemed to think it was from the former. Also there was the effect to be considered on the growing eye. It has been shown experimentally by Triboudeau and Belley⁹ that the X-ray will induce cataract and interfere with the growth of iris pigment in young rabbits, but not in old; and in von Hippel's experiment with X-ray on the abdomen of a pregnant rabbit which produced cataract in the young; nothing had been reported to my knowledge on the effect of radium. In this connection I think it would be well that ophthalmologists in reporting the results of the use of radium in this or any other condition should on reporting the case, if it seems that the final results are worth reporting, give the exact technic with the number of milligrams, amount and character of filter, and length of time the radium is used, for the guidance of those that may seek to profit by their experience.

With regard to the effect, manner of application, amount and time of application, if possible the treatment should be left in the hands of the radiographer; with the ophthalmologist carefully checking the case at frequent intervals thru a widely dilated pupil and, if necessary, with the patient under a general anesthetic. At best, in the hands of the most experienced, radium therapy is still in its infancy, and any data that any of us may add will help to early prove or disprove its value. The question of dosage and technic is of the greatest importance, as it is easy to

assume that too slight a dose might stimulate an otherwise fairly quiescent growth to great activity, while too large a dose might cause irreparable damage.

It might be sufficient in discussing the physical properties of radium to state that the rays emitted from radioactive bodies are very similar to those produced in an ordinary X-ray tube, there being three distinct types, i. e. the Alpha, Beta, and Gamma rays. The principal difference is accounted for by the fact that the Alpha and Beta rays are expelled at higher velocities than the canal cathode rays, and the Gamma rays are more penetrating than the X-rays. The Alpha and Beta rays are the burning rays. On account of their short range and extremely low penetrating power, the Alpha rays are of little practical value in radium therapy. The Beta rays, however, possess therapeutic value, and can be and should be used where the radium can be directly applied to the lesion. In cases where normal tissues intervene between the lesion and the surface on which the radium is applied, one must screen the radium so that the Beta rays will be absorbed to such an extent as to prevent a burn of the normal tissue.¹⁰ According to New and Benedict¹¹ quoting Horsley and Finzi, "Radium rays from which the penetrating Beta rays have been filtered off, exert no influence discoverable by present methods on nerve tissue." Allowing then for the fact that the Beta rays are the most effective in nerve tissue, and that they are very short rays, it seems that radium may still be used in the treatment of glioma, as the Beta rays do not necessarily have to be entirely filtered off, but with the exposure timed just short of a burn. The radium may be placed very close to the growth, when it is in the eye. If it is shown to be effective in the absorption of glioma, a technic might be evolved by posterior sclerotomy and radium needles to place the element in the center of the growth itself.

I wish to close by a brief report of my own case, and while I realize that too short a time has elapsed to be able to form any opinion as to the value of

the treatment, I hope to profit by the experience of others as brought out in the discussion, and to briefly give my own technic, which may or may not be of benefit to others.

CASE.

HISTORY. White, male; aged eleven months when first seen. Norwegian parents; both alive and well. No history of eye trouble in the family. One other child, female, aged two and a half. Family history negative as to eye trouble. Past medical history negative. Normal delivery. Has always been an unusually healthy child; breast fed. At about the age of three months mother noticed a peculiar appearance of left pupil, seemed lighter than the right, especially when the light shone on it a certain way. No other change and child apparently saw well. About four weeks before admission the yellowish reflex in left eye became rapidly much more apparent. No signs of discomfort at any time. No apparent change or redness in eye except for increasingly yellow pupil.

EXAMINATION. Patient first seen on April 7, 1920. White, male child, well developed and apparently in the best of health. Examination negative with the exception of the eyes.

Lids, cilia, palpebral fissure, lacrimal apparatus, conjunctiva, cornea, anterior chambers, iris apparently normal in all respects. The left pupil showed a marked yellowish reflex. Normal in size and reacted to light. The right pupil was round, equal, black and reacted to light and accommodation. Vision right apparently good for near and distance. Very small objects. Vision left apparently very poor. The pupils were dilated with homatropin and the patient given a general anesthetic. Tension right and left 40 mm. Hg. with McLean tonometer.

Examination of the left fundus showed the media clear and a small area of the retina to the temporal side of the bulb could be seen, apparently normal. Coming from the nasal side, apparently from the retina was a yellowish grey tumor, completely covering the disc and filling about two-thirds of the posterior chamber. Growth was slightly irregular, nonpigmented with retinal vessels extending over and into it.

The right fundus was negative. with the exception of a growth similar in character but much smaller starting apparently from the retina. Measuring about four mm. at its greatest thickness and extending from well behind the iris to a point about 2 mm. from the macular region. A diagnosis was made clinically of bilateral retinal glioma.

On April 10, 1920, the left eye was enucleated, cutting the nerve as far back as possible. There were no macroscopic signs of extension beyond the bulb with the exception of a few apparently fibrous adhesions of the sclera to the orbital tissue in the region of the nerve to the nasal side and anterior. Specimen sent to pathologic laboratory and report returned "retinal glioma" with slight involvement of the nerve and paraneural sheath. Uneventful postoperative recovery.

On April 17, 1920, 30 mgs. of radium sulphat was applied to the right eye and left orbit. The lids being sealed with adhesive, and radium held in place with adhesive strips. Time 8 hours for each application. Radium screened with 1.4 millimeters of gold and 12 millimeters of gum rubber. No reaction reported.

On April 28, 1920, child returned, pupils dilated with $\frac{1}{2}\%$ homatropin, anesthetized and right fundus examined. No change seen. Second application of 50 mgs. radium sulphat. Time, screen and technic the same to eye and orbit. No reaction reported.

May 7, 1920, pupil dilated as before, anesthetized. Still no change seen in growth. No signs of recurrence left. Left socket well healed and apparently healthy. 75 mgs. radium sulphat ap-

plied. Time, screen and technic the same. There was a marked reaction in four days time. The outline of radium container plainly seen over both orbits; lids slightly edematous and very red. Conjunctiva red and congested. Cornea clear, slight ciliary congestion, anterior chamber and other media clear. Iris normal. Pupil widely dilated, remaining so for six days. All redness disappeared in one week and pupil became normal.

Patient reported for observation on June 7, 1920. No signs of recurrence left. Right pupil dilated with homatropin. Anesthesia. Apparently no greater in extent. Tension 40 McLean, anterior chamber normal. Peculiar silvery looking spots over center of growth. Vision before dilation apparently good. No signs of conjunctival or ciliary injection.

Last seen July 12, 1920. Vision apparently good, child a little irritable and fretful. Mother says he is cutting teeth. Gingiva red and swollen in molar region. Pupil normal; dilated with homatropin, anesthetic. Growth much flatter; same in extent. Tension 40, McLean. Media clear. No conjunctival or ciliary injection. Growth about 2 mm. thick. Large areas in center of tumor that look like silvery white exudate. No sign of recurrence left. Mother says child appears perfectly normal in every way about home.

CONCLUSIONS. 1. Probably 75 mgs. radium sulphat, screened as above, for eight hours is about the maximum dose for child of one year.

2. All other conclusions are held in abeyance until a longer time has elapsed.

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AN APPARATUS FOR TESTING LIGHT AND COLOR SENSE.

PROF. C. E. FERREE and GERTRUDE RAND, PH.D.,

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This apparatus worked out for use in the Laboratory of Psychology in Bryn Mawr College has been further developed into a form fitted for practical clinical work. Previous description will be found page 335.

In a former paper an apparatus was described which was devised particularly for determining acuity at low illuminations. In this apparatus, it will be remembered, uniformity of illumination of the test surface was secured by projecting upon it the image of an evenly illuminated aperture at the inner end of a projection tube of a lantern or lamp house. In order to secure a uniform illumination of the aperture, the lamp house was lined with opal glass ground on one side and the aperture itself was covered with a slide of ground glass. The source of light was a 100-watt type C mazda lamp of the round bulb or stereopticon type, with its filament well above the aperture to be illuminated. The changes of illumination were produced by an iris diaphragm placed immediately behind the focussing lens in the projection tube, which reduced the illumination without changing the size or shape of the image. The test object was a broken circle fastened at the center of a graduated dial, the opening of which (visual angle 1 min. at 6 meters) could be turned into any meridian that was desired. The angle of turning could be read in terms of divisions on the dial which was graduated to correspond to the readings on the trial frames.

A consideration of the principles of this apparatus reveals at a glance that they lend themselves readily to light and color sense testing in office and clinic work. In order to convert it into a light sense tester three features are needed: (a) the choice of an aperture such that when magnified fivefold a stimulus is obtained of a size and shape suitable for a sensitive judgment of the threshold of sensation; (b) the provision of a suitable surface on which to project the magnified image of the aperture; and (c) a means of reducing the intensity of light from the acuity

threshold to the light sense threshold, i. e., from the amount needed just to discriminate the standard acuity object to the amount needed just to arouse the light sensation. The iris diaphragm used in this apparatus, range of pupil 5-6.5 mm., does not provide for this range of intensity without changing the source of light.

It is obvious that an attachment for the further reduction of the light which does not interfere in any way with the apparatus for the acuity work, would afford a more convenient means of securing the lower intensities than the changing of the source of light. Provision has been made for this in two ways: (a) by neutral absorption screens and filters; and (b) by a Nicol prism (polarizer and analyzer). The attachment is made so that it will hold either of these reducing agencies, leaving the operator an option as to which shall be used.

The filter holder is made from three grooved metal strips, 8 cm. long and of appropriate width and thickness, built into a three-side rectangular figure open at the top. It is fastened to a narrow collar which slips over the end of the projection tube of the acuity apparatus, and is held in place by a set screw. The holder is provided with three grooves into which one, two, or three filters 8x8 cm. may be inserted as desired, or the metal plate which holds the Nicol prism.

The Nicol prism is mounted in telescoping tubes in the customary manner for reducing light intensities, one tube containing the polarizer and the other the analyzer. At the end of the tubes containing the analyzer is a large milled head by means of which very small angles of rotation may be made. The angle of rotation is read by means of a graduated dial, 6 in. in diameter; and an indicator with a Vernier scale, attached respectively to the tubes con-

taining the polarizer and analyzer, on either side of their junction. The tube containing the polarizer is firmly mounted in a brass plate 8x9 cm., with its axis coincident with the normal to the plate at its center. When the Nicol prism is to be used instead of the filters, this plate is inserted in one of

short slender rod. The other end of this rod is screwed at right angles into the side of the same bearing in which turns the rod carrying graduated dial and broken circle which serve as the acuity test object. Thus by rotating the stem supporting this bearing 90 degrees, either test object can be pre-

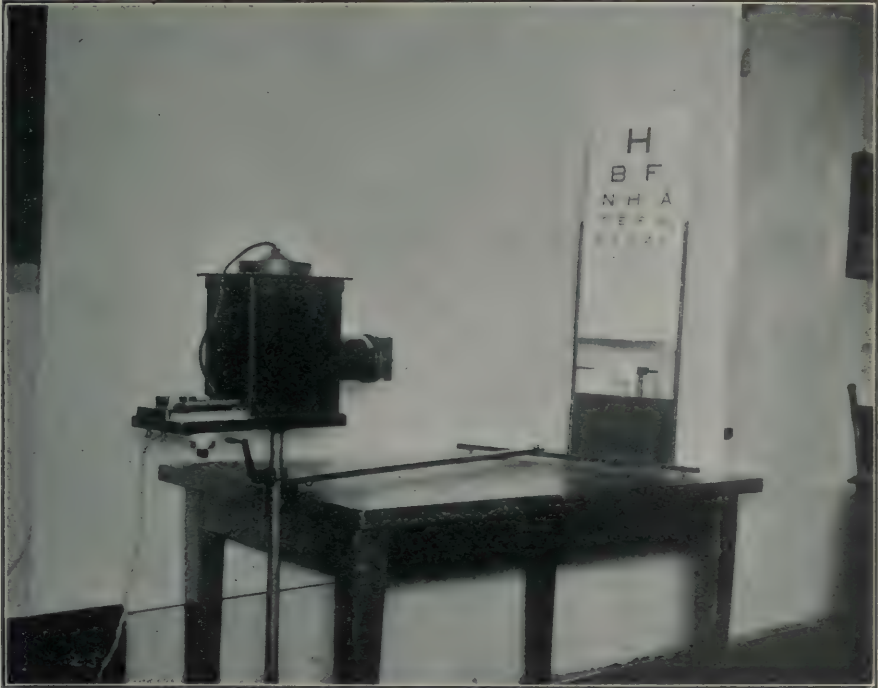


Fig. 1—An acuity lantern with an attachment for testing the light and color sense.

the grooves of the filter holder. So inserted its axis is in the principal axis of the projection lens of the acuity lantern, and the inner end of the polarizer is in contact with the outer surface of the projection lens. When the filters are employed to reduce the light, they are inserted in the holder to give the large initial cut down, and the further graded reduction is made by the iris diaphragm of the acuity lantern. When the Nicol is employed, the iris diaphragm is set at its minimum aperture, 5 mm., and the further reduction is made by the Nicol and read from its scale.

The test surface is of aluminum, 5x5 cm., coated with a mat white surface. It is mounted at the end of a

sent to the observer's view. Both test objects can be easily detached and others substituted as desired.

The testing of the color sense is provided for by inserting color filters in the beam of light. These filters may be inserted at the illuminated aperture; in the filter holder in front of the iris diaphragm; or, with a slightly different construction of projection tube, back of the lens as near to the iris as possible. The simplest of these possibilities, from the standpoint of the construction and operation of the apparatus, is to insert the filter in the holder immediately in front of the lens, and cut down the light intensity by means of the iris diaphragm. If it should be desired or considered techni-

cally more correct, however, to produce the changes in intensity after the light has been passed thru the filter, this result can be accomplished; either by inserting the filter at the illuminated aperture or anywhere in the projection tube back of the iris, or by placing it in front of the lens, with the iris held constant, and changing the intensity by means of the Nicol prism. The same test surface is used for testing both the color sense and the light sense. The acuity apparatus with the attachments for testing the light and color sense is shown in Fig. 1.

Color sense apparatus for clinic purposes seems at present, so far as the central field is concerned, to be limited to the testing of such gross deficiencies as are classed as color blindness. They are of little use for detecting the smaller changes which mark the advance and recession of many pathologic conditions. The present apparatus is designed for detecting and measuring the degree of deficiency, in terms of the amount of light of a given range of wave lengths which is required just to arouse the color sensation.

SPONTANEOUS LUXATION OF THE EYEBALL

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This is the report of a case of a rare condition. Little is to be done for it in the way of treatment. But the ophthalmologist should know of its occurrence. If all cases were studied and reported something might be done in the way of prophylaxis.

Spontaneous dislocation of the eyeball is a rare condition. The late Dr. T. O. Powell told me of a case occurring in an epileptic patient in the Georgia State Hospital for the Insane, of which he was superintendent. The patient was a male, white, and had been in the institution for many years.

At each of his attacks, which were frequent, he would fall backward striking the back of his head and both ocular bulbs would be displaced and hang out upon his cheeks until put back into their sockets by his nurse. His vision seemed normal and when he recovered from the fit the eyes gave him no pain and their motility was unimpaired.

Kimball¹ reports a case in an insane man who played with one eye, displacing it and replacing it constantly. This eye was without vision there being total optic atrophy.

Tucker² reports two cases. The first was in a woman with cerebral gumma and occurred "while a nurse was looking at her." In this case there was recovery. His second case was one of exophthalmic goiter in a woman with a very large thyroid.

"She states that at times the exophthalmos has been so great that each eye has protruded from its socket about six times, sometimes without known cause and sometimes when wiping them with a handkerchief." She was always able to replace them herself.

Galloway³ observed a case in a male. There was complete luxation of the eyeball while removing a foreign body from the cornea the lids being retracted by the fingers.

Levin⁴ reports a case in a male 53 years of age, who was quite corpulent and who had bilateral exophthalmos. The globes could be completely covered by the lids. Eyes of the whole family were very prominent. He thinks the condition in this case possibly due to excessive fat in the orbit with venous stasis. He mentions a case reported by H. Cohen and three by Prof. Uthoff of Breslau but considers his own the only one in which there was no Basedow's disease or other assignable pathologic cause. He contemplates operation for reduction of the palpebral fissure as relief for the condition.

My own case was that of a negro

female, about 25 years of age, who came to my clinic for relief for itching lids. One of my students slightly retracted her lids with his fingers and the eye, as he expressed it, "jumped at him." I was out of the room for the moment and on my return questioned the patient as to her previous history.

movements normal. Ophthalmoscopic examination negative.

I asked our photographer to prepare for making a picture of her and when he was ready I retracted the lids of her left eye with my fingers with the result that immediately the globe popped out.

There was considerable bleph-



Fig. 1—Spontaneous luxation of eyeball, showing lids retracted behind the globe and held there by blepharospasm. (Oertel.)

She stated that on several occasions her left eye had come out. It first occurred when she was stooping over tying her shoe and she had to be very careful not to assume this position as her eye was likely to be displaced if she did so. The first dislocation had taken place two months previous to her visit to the clinic.

She was rather thin but said she was in good health and had not been ill for a long time. There was no evidence of goiter. Both eyes were prominent, vision in each 20/20 and ocular

arospasm but the eye was easily replaced. She was instructed to return to the clinic the next day but unfortunately she did not do so, and further study of the case was not possible as the address she gave was incorrect and she could not be traced.

I was out of the city on a vacation when several months later she was recognized by one of my students having come to autopsy as a coroner's case.

It seems she died quite suddenly and without known cause or previously recognized illness.

The pathologic findings were negative except for a small tumor that was found in the cerebellum. This was benign in character, and so its influence

was entirely due to pressure. It was evidently the cause of death.

What influence it had upon the eye condition is a question.

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REPORT OF A CASE OF CHRONIC GLAUCOMA, WITH RESULTS FOLLOWING OPERATION.

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JOHNSTOWN, PA.

This report is accompanied with charts of the visual field showing the results of treatment.

As the question of treatment of glaucoma with contracted fields is often a perplexing one, I believe that all such cases if treated surgically should be reported with the exact results obtained.

The case which follows is that of a college teacher, 44 years of age, who suffered no inconvenience from his eyes until in 1908 when at the age of thirty-three he visited an oculist for the relief

of headaches. The right eye was found to be so astigmatic that the doctor prescribed a plain lens explaining that to correct an eye unaccustomed to acute vision would increase the headaches.

His headaches persisted until two years later when he was refracted by another oculist who fully corrected the astigmatism with comfort to the patient.

Four years later while delivering a

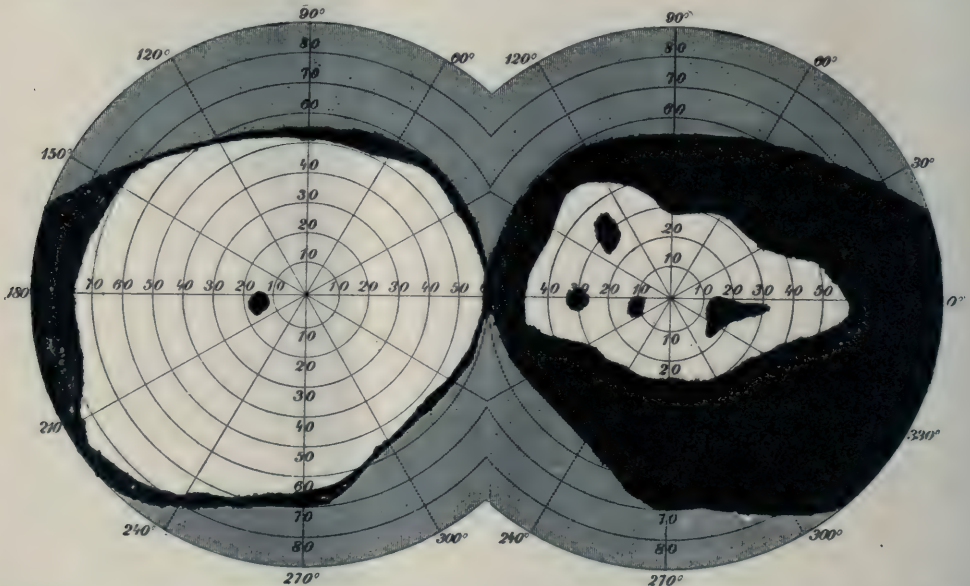


Fig. 1—Chronic glaucoma. Fields taken before operation showing contracted right field with multiple scotomata.

six months' series of lectures, using a stereopticon, which he operated while lecturing, his eyes became painful and inflamed, and he again visited an oculist.

To rest his eyes the doctor prescribed tinted glasses and a 1% solution of homatropin hydrobromat. This was used every third hour three days each week for a period of four weeks.

During the following three years his

cup, apparently physiologic, affecting chiefly the temporal side.

The tension of the right eye (Gradle-Schiötz tonometer) was 52; left eye, 40.

An examination of the fields showed the right field reduced to less than one-third the normal area, and with four negative scotomata. The left field was much less contracted, and without scotomata.

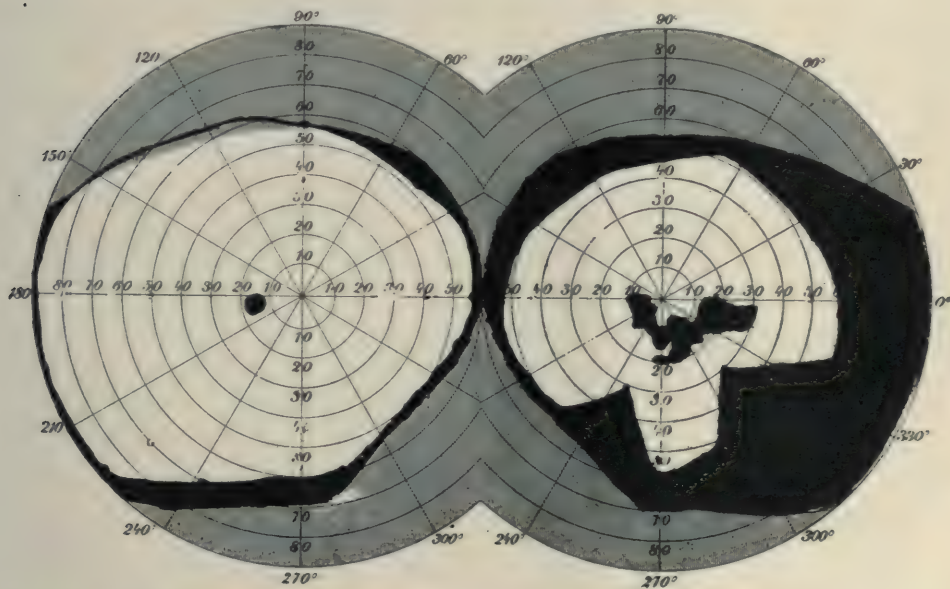


Fig. 2—Chronic glaucoma. Fields taken six weeks after operation showing enlargement of right field and one large scotomata.

eyes received no treatment altho they were never entirely comfortable. When he had taxed his eyes by studying, he would awaken at night feeling that "the eyeballs were too large for the sockets" and with a throbbing pain, always worse in the better eye.

When first seen by us in January, 1919, his manifest refraction was as follows:

R.—.50 sphere—4.50 cyl. ax. 180° V. = 6/9.

L.—.50 sphere— .50 cyl. ax. 10° V. = 6/4.

The ophthalmoscope showed in the right eye a pigmented, choroidal patch between the fovea and the disc and a glaucomatous cup 1.6 mm. in depth. The left eye showed only a rather deep

Eserin. salicylat. was prescribed in one-fourth per cent strength, twice daily. Tests of the tension made weekly showed an average tension under eserine of 47 in right and 28 in left.

On March 31, 1919, an iridectomy was performed on the right eye. Recovery was normal.

Six weeks after the operation an examination of his fields showed that the right field was increased about one-fourth in area, and that two of the scotomata had disappeared, while the other two were enlarged and united to form a semicircle. The tension of the eye was found to be 26, that of the left eye to be 28. The eyes were comfortable.

The manifest refraction on June 11 was:

R. — 2.00 sphere \ominus — 2.00 cyl. ax. 125°
V. = 6/15.

L. — .50 sphere \ominus — .50 cyl. ax. 10°
V. = 6/4.

The case is of interest especially in that the glaucoma here affected a myopic patient; that the condition was

more advanced in the eye with the higher astigmatism; that more distress was felt in the less affected eye; that the glaucoma may have been caused or increased by an injudicious use of homatropin and dark glasses; that an iridectomy while relieving the tension, greatly increased the size of the visual field, altered and enlarged the scotomata, and decreased the visual acuity.

NOTES, CASES AND INSTRUMENTS

PIGMENTED HAIRY MOLE INVOLVING CORNEA.

OTIS WOLFE, M.D., and F. L. WAHRER, M.D.

MARSHALLTOWN, IOWA.

Mabel D., age 12, consulted us April 9, 1920, in regard to a growth on the right eye. Her parents were not with her, but the grandmother said the

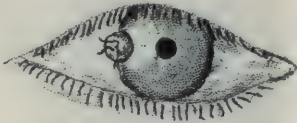


Fig. 1—Position of pigmented hairy mole upon margin of cornea. Case of Wolfe and Wahrer.

growth had been present since birth. The eye is slightly inflamed and painful at times, due to the irritation of the growth. Three years ago the patient was seen by an ophthalmologist who removed several hairs from the growth.

EXAMINATION. Vision, 18/15 each eye. Tension, normal. Pupils, react to light and accommodation. Fundi, normal.

Upon examination of right eye, a round, slightly raised growth was to be seen at the corneoscleral junction, externally. It was about 3 mm. in diameter and extended onto the cornea for a distance of about 1 mm. The center was slightly pigmented and contained three hairs. We wish especially to call attention to the fact that there was a distinct involvement of the cornea in this case; a condition which

is quite rare. Upon removal of the hairs, they were found to measure $6\frac{1}{2}$ mm., $4\frac{1}{2}$ and 2 mm. respectively. A diagnosis of pigmented hairy mole was made, and the parents were advised as to the nature and possible danger of the growth, and the necessity of keeping the patient under observation.

A CASE OF PERIPHERAL COMMUNICATING VESSELS BETWEEN THE RETINA AND THE CHOROID

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The rarity of descriptions of this condition warrants the addition of individual cases, even tho there is no accompanying pathologic examination. In a recent article, Feingold was able to compile ten such cases from the literature, and to these he added four cases of his own. For a discussion of the fourteen cases, the reader is referred to Feingold (A.J.O. v. 3, p. 499).

A girl of 19 came with the complaint of blurred vision on continued reading. The right eye had been useless following an attack of measles at the age of eight and four weeks ago the left eye had become inflamed. The inflammation subsided within a week, but was followed by continuous black spots before the eye. Her father died of paresis and the mother of pneumonia. Her history was otherwise negative.

The right eye diverged slightly. The anterior portion of the eye was normal.

Ophthalmoscopically, the disc was slightly pale, but otherwise normal. The site of the macula was occupied by a sharply defined circular area, about twice the size of the disc. This was irregularly pigmented with feathery black pigment, and presented the usual picture of an old area of pigmented retinochoroiditis. Above this area was a small white area of retinochoroiditis, lying between two normal vessels and surrounded by hyperemic retina. This was undoubtedly an area of acute inflammation. To the temporal side of the

tering a deep cup of the optic nerve head. With the addition of minus lenses, the course of the vein could be followed for about $\frac{2}{3}$ of a millimeter until it disappeared under the pigment that bordered the center of the area.

Two small veins arose just below this same area and united a short distance from their origin. The course of the united vein led to the inferior nasal edge of the area, where the vein disappeared at the junction of the two lobulations of the edge of the area without changing level. This vein var-

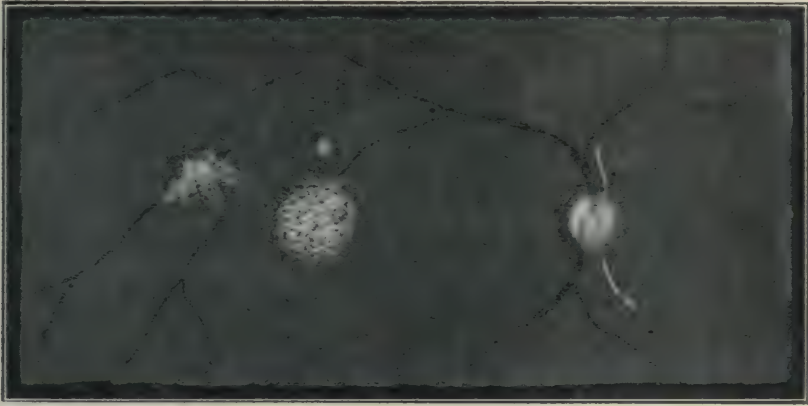


Fig. 1.—Gradle's case of old retinochoroiditis, with one scar in region of macula of right eye and another to the temporal side. Two large retinal veins enter the latter and pass back to the choroid.

macular area and slightly above was a smaller lobulated area of pigmented retinochoroiditis, closely resembling the large central area except that the edges were not so clear cut, were lobulated or serrated, and the pigment was irregularly clumped. The exact center of the area was pure white and entirely devoid of pigment.

Three small veins, arising in the temporal periphery of the retina, converged toward the latter area, and united to form one fair sized vein about three disc diameters away from it. The course of these veins could be traced from the inception. The large vein passed on to the surface of the retinochoroiditic area at the inferior temporal border, and headed directly for the clear central area. In the exact center of the pigment-free area, the vein bent sharply downward and disappeared from view, precisely as does a vein en-

tered from others described in that it did not enter the area in question but disappeared at the border of the area. However, there can be but little doubt that this was a communicating vein between the retina and the choroid.

The remainder of the eye presented no abnormalities, except that the vision was reduced to less than 0.1, owing to the central lesion which produced a central scotoma of about fifteen degrees. The scotoma produced by the smaller area could not be outlined.

The left eye was externally normal. Ophthalmoscopically, there was an early stage of albuminuric retinitis with rather extensive exudation. Nothing unusual presented itself in this fundus.

The Wassermann reaction was negative. Examination of the urine revealed albumin in moderate quantities with hyalin and granular casts. There

were no other pathologic physical findings.

Undoubtedly a venous communication between the retina and choroid must exist in many cases with old lesions involving those structures, and such conditions are overlooked or not remarked in the routine examination. Clinically there is but little significance to this anomalous condition beyond that it denotes the long existence of the underlying lesion.

MARKED CLEARING OF VISION IN UNOPERATED EYE FOLLOWING OPERATION FOR CATARACT.

E. N. ROBERTSON, M.D.,

CONCORDIA, KANSAS.

Reported at the Colorado Ophthalmological Congress, July 23, 1920.

On May 22, 1919, Mrs. S., a nice looking, agreeable old lady, enjoying good health at the age of 70, presented herself to me, complaining of failure of vision, especially for reading. The history of the complaint was as follows: Sight of right eye gradually failed several years ago, but up to a couple of months ago could see to read with left eye.

Examination revealed:

V. R. E. 18/200 dimly, +4. improves slightly.

V. L. E. 18/100 + 2.25 \odot + 0.75 cx 120 = V. 18/40.

Well developed, but not mature, cataract in right eye, incipient cataract in left eye. Both eyes free from congestion. Tension normal in each eye.

On account of the fact that the left eye could be so improved with lenses, glasses were prescribed and the patient advised to report in six months.

On November 14, 1919, patient returned stating she could no longer read with her left eye and insisted on something being done. The examination at this time showed:

V. R. E. 18/200 dimly. Nothing improves.

V. L. E. 18/200 + 2.00 \odot + 0.75 cx 120 = V. 18/50. Left lens apparently more cloudy than at first examination.

December 1, 1919, a combined cataract operation was done on right eye. A moderately tough capsule was encountered. Lens delivered without loss of vitreous.

Jan. 2, 1920, R. E. + 10.00 \odot + 2.00 cx 90 = V. 18/70.

Capsule and slight amount of unabsorbed lens matter present.

Eye still a little injected. An occasional pain in eye in morning.

Gave R for sodium salicylat gr. 15 to be taken t. i. d.

Jan. 26, 1920, right eye practically clear. With + 10.00 \odot + 2.00 cx. 90 = V. 18/70.

Feb. 6, 1920, made a capsulotomy, vertical incision, causing capsule to gape nicely. Patient reported at this time that since the operation vision of left eye had gradually improved and that now she could read ordinary newspaper type with the glasses which had been fitted before the operation, eight months ago.

Feb. 9, 1920, R. E. + 12.00 \odot + 2.00 cx 110 V. = 18/20.

L. E. + 2.00 \odot + 0.50 cx 90 V. = 18/20.

Reading. R. E. + 15.00 \odot + 2.00 cx 115 = any type.

L. E. + 5.00 \odot + 0.50 cx 90 = 0.50 m. type.

Ophthalmoscopic examination. Instilled homatropin in left eye. Fine and coarse opacities scattered thruout left lens. Can see fundus nicely thru less opaque portion of lens.

We know that dionin and subconjunctival injections, together with suitable constitutional treatment will often cause opacities of the lens to absorb. Is it possible in this case that the nonuse of the eyes, the rest in bed and the general benefit of the hygienic life of the hospital for a few weeks could have caused this lens to clear? There is no reason to believe that the removal of the more mature cataract in the right eye could have had anything to do in bringing about the favorable result in the left eye. Or is it more likely that there was a cloudiness of the vitreous complicating the cataract, which was unobserved at the first examination? During the six months intervening be-

tween the first and second visits this cloudiness may have increased. The only medication used was thirty-two doses of 15 grains each of sodium salicylat. The clearing of the left eye was noted after this. There were no signs or symptoms at any time of an inflammation of either eye previous to the operation, altho the improvement in vision of the left eye following the use of the sodium salicylat suggests

to us the possibility that there may have been present a mild uveitis, due to some undiscovered toxic cause, with clouding of the vitreous, which cleared following the rest to eyes and body and the use of the salicylat.

Whatever the explanation the favorable result has remained constant during the six months that have elapsed since the last glasses were fitted.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

COLORADO OPHTHALMOLOGICAL SOCIETY

April 24, 1920

DR. MELVILLE BLACK, Presiding

Blue Sclerotics.

E. T. BOYD, Denver, presented a brother and sister, members of a family of thirteen children, five of whom, including the two patients presented, had blue scleras, and had each sustained three or more fractures of the long bones.

DISCUSSION.—G. F. Libby, Denver, said that in his study of the subject he had found a general agreement as to the occurrence of the two conditions, blue sclerotics and fragility of the bones, in the same patients.

New Growth Near Corneal Limbus.

E. T. BOYD, Denver, presented a woman aged 23 years who a year and a half previously had first noticed a small red spot just to the outer side of the cornea of the left eye. The spot had remained about the same size and color for a year, and then began to turn yellow and to enlarge. For the past four months development had been quite rapid. The scleral vessels beneath the growth were engorged and increased in number, and there was a liberal blood supply to the growth.

DISCUSSION.—W. C. Bane, Denver, would pick up the conjunctiva in the region of the growth and excise it.

Melville Black, Denver, would further cauterize the base of the growth with

trichloroacetic acid, after excision and curetment.

Steel in Lens Capsule.

E. T. BOYD, Denver, presented a man aged 34 years who five years previously had been struck in the eye by a nail which he was driving. The lens had remained clear for some time after the injury, but the nucleus was now cataractous, altho the cortex remained clear. There were good light perception and projection. The lens opacity contained several spots of yellowish discoloration. X-ray study of the case by Dr. S. B. Childs several years previously had shown a metallic foreign body in either the capsule or the lens. At the present time the foreign body was visible in the anterior capsule.

DISCUSSION.—E. F. Conant, Denver, who had seen the case about the time of the original injury, said that there were at that time no symptoms with the exception of the opacity of the lens.

W. C. Bane, Denver. The lens should be removed. If the foreign body can be taken out without removing the whole lens this should be done.

Melville Black, Denver. Within the next twenty years, if the eye is left as it is now, it will probably get into trouble, developing a chronic uveitis which will endanger the eye. The lens should be washed out after a broad capsulectomy. But the foreign body should be removed first.

G. L. Strader, Cheyenne, Wyoming, recalled a case in which twelve years

after the observation of a small coloboma of the iris, following a blow from a foreign body which was said to have been removed by a general physician, the eye developed a marked inflammation, with the formation of exudate in the anterior chamber originating at the coloboma.

D. H. Coover, Denver, remarked that in such cases it was always good practice to introduce the magnet after removing the lens substance.

Dr. Boyd believed that the best plan would be to make a fairly good-sized section, as for traumatic cataract, open the capsule above the foreign body, break up the anterior portion of the lens, go in with the small tip of the magnet, and finally wash out the lens substance.

Sulphuric Acid Burn.

H. R. STILWILL, Denver, presented a man aged 22 years, whose left eye had been burned on March 8, 1920, by a splash from a motor battery containing strong sulphuric acid. The eyelids were not burned. The cornea was opaque, the bulbar conjunctiva red and edematous, and there was symblepharon of the upper lid to the eyeball. There had been no clearing of the cornea, and the patient had very little vision. The patient had not been seen by Dr. Stilwill until a few days after the accident, and at this time there was vision of 4/20, and the outlook seemed fairly good. But the opacity steadily increased, the deeper layers of the cornea becoming involved.

DISCUSSION.—E. T. Boyd, Denver, would remove all the granulations from the upper cul-de-sac.

W. H. Crisp, Denver, believed it undesirable to interfere at all until the final stage of scarring was reached.

D. H. Coover, Denver, thought that removal of the granulations would make the symblepharon worse. Fifteen years ago he had seen a case in which both eyes were filled with lime, both corneas becoming hazy. The patient recently reappeared after not having been seen for fifteen years. One cornea was relatively clear, and the other just as bad as it was fifteen years previously. Dr. Coover had found that in these burns of the cornea a weak solution of eserine improved the nutrition of the eye.

G. F. Libby, Denver, described a recent case in which the cornea had escaped, but the episcleral tissue and conjunctiva were completely destroyed over an appreciable area. The area of destruction had filled in nicely, altho there was a little symblepharon between the eyelid and the ball. But it was possible to overcome that entirely by massage, in which the patient was instructed.

C. O. Eigler, Denver, had seen a case in which a carbon remover had got into the eye, and the cornea broke down until it ruptured.

Melville Black, Denver, thought that the granulations were acting as an irritant, just as they did in a case of trachoma; and could not see how any harm would be done by removing the granulations.

Dr. Stilwill stated, that he was already using a solution of eserine as recommended by Dr. Coover.

Paralysis of Superior Oblique Muscle.

C. O. EIGLER, Denver, presented a man aged 55 years who for twelve years had suffered from double vision for all objects in the direct line of vision. The condition was apparently due to a fall on the back of the head which had produced an unconsciousness lasting six weeks. Objects in the peripheral field appeared to be single. The upper object was seen by the left eye and was slightly to the right of the lower object seen by the right eye.

DISCUSSION.—Melville Black, Denver. The case has been diagnosed as one of paralysis of the superior oblique. It is peculiar, however, that the patient gets single vision in the upper and lower parts of the field. But he has probably been pretty well trained in diagnosis and is likely a profound neurasthenic, so that his mind is probably thoroughly made up as to where and when he gets diplopia.

Guttate Choroiditis.

J. M. SHIELDS, Denver, presented a man aged 26 years who had had active pulmonary tuberculosis for the past five years, and who two years previously had noticed that the vision of the left eye was failing. The right eye was normal. The left fundus showed a number of small whitish spots situated around the macular

region, especially between the macula and the disc. The vision of the left eye with correction was 5/10. The urinalysis was negative.

DISCUSSION.—H. R. Stilwill, Denver, had seen the case some time back for refraction and had noted the dots.

W. C. Bane, Denver, had seen several cases of a similar character, but this was the youngest. Nettleship had shown an illustration of such a case under the title *gutta choroidea*.

Magnet Extraction.

W. H. CRISP, on behalf of D. A. STRICKLER, Denver, showed a man aged 28 years, from whose right eye a small particle of iron imbedded in the iris had been extracted with a hand magnet. Early in January the patient had jerked a staple out of a fence, and the staple struck him in the right eye. The eye at once became blind. The lens was cataractous, and lens substance escaped thru a rather large opening towards the outer side of the cornea. The case had been shown by Dr. Strickler before the Colorado Ophthalmological Society on January 17. After that the vision cleared somewhat and the eye behaved well, without pain, for a month or so. One night about the 8th or 9th of March the eye became suddenly painful and vision absolutely nil. From this time on the eye was bad a day or two at a time and then better a day or two.

When he returned to Denver on April 12, there seemed to be a small foreign body projecting from the iris at its extreme nasal side. X-ray study of the case by Dr. F. B. Stephenson confirmed the presence of a fragment of steel in this position. On April 14 the piece of steel was easily extracted with the hand magnet thru an incision at the corneal limbus. The remaining lens substance was washed out, and an iridectomy was done upward and inward. There remained a firm mass of exudate between the iris and the original corneal wound. In spite of rather marked indication of infection at the time of the original injury and afterwards, the eye had shown steady improvement since the operation. (In the early part of September, 1920, the patient reported that the eye was comfort-

able and that there had been slight improvement in vision.)

Mydriatic Intoxication.

W. A. SEDWICK, Denver, reported a case of acute intoxication from the use of "homatropin solution" in a man of 36 years. The patient, a physician, had had a cycloplegic used upon him nine times previously, and no symptoms of poisoning had occurred after any of the previous applications. He was given a prescription for homatropin hydrobromid 1.5 per cent. After getting the prescription filled, the patient put a drop of the solution in each eye. He went immediately to his automobile to drive three or four blocks. Before going far he felt that he would better return, and did so with a great deal of difficulty. At his office his nurse attendant, noticing his widely dilated pupils, his restlessness and thickness of speech, suggested that he should not use any more of the drops, but upon his insisting put a second drop in each eye. Vision became greatly blurred, speech was difficult, and there was some lack of coordination. It was impossible to keep the patient still and he began to pick at imaginary insects, etc. Five drops having been ordered, the patient requested the attendant to put still another drop in each eye, but she refused. Thereupon he performed the instillation himself.

After a half hour he was brought to Dr. Sedwick's office. He had literally to be dragged, because of the relaxed condition of his musculature. He was greatly excited, did not realize just where he was, speech was very thick, and he was unable to say what he wanted or to name letters. The pupils were dilated ad maximum, the accommodation completely lost, and he picked at imaginary insects on himself and the furniture.

He was sent home, where he continued in the same condition for about six hours. At this time he returned to the office and a refractive measurement was made. The patient still showed the effects of the drug, was not able to talk plainly, and had no recollection of what had happened from the time he put in the first drops or a very few minutes after. Accommodation did not return for more than two weeks. Even six weeks later

the patient still had trouble in enunciating words, and his tongue was somewhat "thick." The drug was from a fresh bottle just obtained from a wholesale house of repute, and manufactured by a prominent chemical company. The case should, however, perhaps be regarded as one of acute hyoscin poisoning.

DISCUSSION. D. H. Coover, Denver, about the time William Thomson was using duboisin a good deal in 1878, instilled a one to two hundred and fifty solution of that drug in a patient's eye about 9 a. m. About 10 a. m. she commenced to develop peculiar symptoms, including hallucinations and a general paralysis. There was no control of either urine or bowels, and it took physicians a whole day to bring her out of the condition.

C. O. Eigler, Denver, had had two cases of temporary paralysis from the use of hyoscin solution.

WILLIAM H. CRISP,
Secretary.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

April 19, 1920.

DR. G. ORAM RING, Chairman.

The Frost-Lang Operation.

DR. HOWARD F. HANSELL, after reciting a brief history of the origin of the operation, described in detail the modification of the method practised in the Jefferson Medical College Hospital.

DISCUSSION. Dr. William M. Sweet believed that the employment of a gold ball in Tenon's capsule offered the most satisfactory substitute for the ordinary operation of enucleation; as it ensures greater movement of the prothesis, provides a shallower orbital floor so that there is less retained secretion, and limits the sinking of the tissues beneath the brow. Before the eyeball is removed the four straight muscles are to be secured to the conjunctiva and underlying capsule, but are not to be tied over the implanted ball, as the latter procedure leads often to displacement of the ball. White silk is to be

preferred for the buried sutures, as black silk sometimes shows thru the thinned conjunctiva to the annoyance of the patient. Satisfactory results are reported by the use of chromacized catgut for the sutures in the capsule. At one time it was not believed important to wait until all hemorrhage had ceased before inserting the gold ball. But two recent instances of ultimate displacement of the ball downward probably from distention of the capsular cavity with blood, permitting the ball to sink downward and remain in this position after absorption of the blood, emphasize the importance of stopping all oozing before the ball is inserted. Dry gauze packing in the bottom of the capsular cavity is the most satisfactory means of stopping hemorrhage.

Dr. Heed suggested the advisability of closing Tenon's capsule by introducing sutures well back (5 mm.) from the free border. In closing the conjunctiva it is essential to suture close to the free margins in order to preserve conjunctival tissue.

Dr. Holloway stated that he had performed this operation many times, and with splendid results. So far he was not aware of any instance, among his cases, in which the ball had been lost. He does not rely upon several sutures in Tenon's capsule, but always uses eight to ten of the interrupted type.

The one annoyance, at times, is the persistent bleeding, and he believed this should be thoroly checked before suturing Tenon's capsule, and when bleeding seemed difficult to check with ordinary gauze packing, he has used gauze and very hot water. When but several sutures are used he believed it quite possible for one or more to tear out should there be marked distention from hemorrhage.

Hess Operation for Ptosis.

DR. WM. ZENTMAYER exhibited a woman, aged twenty-three years, operated upon for congenital ptosis. The drooping was very slight in the right eye, but in the left eye, with the aid of the frontalis, the upper half of the cornea was covered. The greater deformity was the hemifacial furrowing

of the forehead by the contracture of the frontalis. The result of the operation done on left eye only was very good, the fold produced by the operation and the elevation of the lid were exactly symmetric with the natural fold and position of the lid of the other side. The lid could be well closed, the folds in the forehead had disappeared.

DISCUSSION. Dr. Hansell said, for the majority of cases of uncomplicated congenital ptosis the Hess operation is probably the most satisfactory. Dr. Zentmayer's result is most gratifying both as to usefulness of the eye and the absence of all deformity. In a patient at present under observation, congenital ptosis of the left side was complicated with paralysis of the superior and external recti; dislocation of the accessory portion of the lacrimal gland outside the orbital limits and enormous hypertrophy of the lid resembling elephantiasis. The Hess operation permanently elevated to a moderate extent only the nasal third of the lid. Two excisions of the skin and underlying tissues and of the dislocated lacrimal gland have partly improved the appearance and have given partial use of the eye. Further surgical treatment will be postponed until the hypertrophied conjunctiva is reduced.

Discission by Complete Division of the Lens.

DR. S. LEWIS ZIEGLER presented two cases of soft cataract in which he had performed discission by completely dividing the lens, thru and thru, with his knife-needle, after the technic of his V-shaped iridotomy. Under full mydriasis the cornea is punctured above. Two V-shaped converging cuts are then made in the lens from below upward, with a sawing movement in line with the axis of the knife, avoiding all stirring up of the lens cortex or vitreous. Sometimes the nucleus is turned out and occasionally the lens sectors fall forward into the anterior chamber. Rapid swelling of the cortex and prompt solution of the same soon follow. As the capsular sac is freely opened, both anteriorly and posteriorly, the physical pressure of the swollen

cortical can only be exerted forward into the anterior chamber or backward into the vitreous, thus freeing the angle from pressure on the ciliary body and avoiding pain and swelling from this cause. The freedom from postoperative sequelæ is very noticeable. Cocain anesthesia can be relied on if double fixation is made with a horseshoe fixation forceps.

CASE I. W. R. L. developed soft cataract at three years. O. S. operation under cocain, with pupil fully dilated. Complete division on April 4, 1917. Discharged from hospital three days later. No reaction, eye cleared in one month when cataract glasses were prescribed. He is now six years old and reads well. A retest on March 25, 1920, yielded the following result: O. S., S + 9.D = 20/20 pt. Add S + 4.D = J-1.

The father of this child was also shown. He had in like manner developed cataract at three years. Dr. Strawbridge had operated on O. S. about thirty years ago, followed by paracentesis, iris prolapse, iridectomy, posterior synechiæ and later retinal detachment. Some years later Dr. Ziegler operated on the right eye without complication. Refraction was S + 9.D at that time. The eye has gradually shown increasing myopia, until now it registers: O. D., S - 1.D \subset C. - 1.25 D. Ax, 90° = 20/20 pt. Add S. + 2.D = J-1. Has useful vision without glasses.

CASE II. R. W., aged eight years. Soft cataract in both eyes; peripheral spicules; fundus hazy. Vision: O. D., 20/100 J-8; O. S., 20/200 J-10.

Operation under cocain and mydriasis, November 19, 1919. O. D.: V. shaped discission freely made. Returned home on fourth day.

November 26. No reaction; cortex swollen; nucleus in anterior chamber.

January 12, 1920. Pupil clearing.

February 20. Ordered cataract glasses.

March 8, 1920. O. S.: Lens divided by converging V thru dilated pupil. Two sections of lens promptly turned out into anterior chamber. Slight reaction on second day relieved by ice

pads. Discharged from hospital in one week.

April 19, 1920. Clear rift in cortex O. S. Some pieces of nucleus in anterior chamber. Test for glasses yields:

O. D.: $S + 10.D = 20/30$. Add O. D.: $S + 4.D = J-1$.

O. S.: $S + 10.D = 20/50$. Add O. S.: $S + 4.D = J-10$.

The vision of O. S. will improve when the cortex is fully dissolved.

Capsulomuscular Advancement Without Incision.

DR. S. LEWIS ZIEGLER exhibited a case of capsulomuscular advancement of the internal rectus operated on by him on May 15, 1918, with the result of orthophoria, which has been maintained up to the present time. There was marked deviation of O. D., which turned out about 60 degrees and could not be made to converge beyond the median line. So far as the patient knows the condition was congenital.

The operation was a modification of the one presented by Dr. Ziegler before the American Ophthalmological Society in 1914, entitled "A New Operation for Capsulomuscular Advancement Combined with Partial Resection."

Both external recti were first divided and traction made with the tenotomy hook, but this only partly straightened the eyes and the right eye still failed to pass beyond the median line. It was then decided to make an advancement of the right internus, but without incision thru the conjunctiva, somewhat after the suggestion of Trousseau.

Following the technic of his former capsulomuscular advancement but without cutting the conjunctiva or muscle, he grasped the internal rectus of O. D. with the forceps and with a double armed single suture made a whipstitch on each margin of the muscle to fix it. The suture was then brought forward to the sclerocorneal junction, where it was anchored securely. Tying the first turn of a surgical knot, traction was then made to pull the muscle and capsule forward until the tissues crumpled up in the line of the parallel sutures and yielded an overcorrection of about 5°. The

suture was removed on the tenth day. Convalescence was prompt and with the wearing of her proper correction all asthenopic symptoms were soon relieved. The result has been permanent (two years) as to both orthophoria and convergence power of internal rectus O. D.

Dr. Ziegler claimed that this operation possessed all the advantages of his partial resection operation with none of its disadvantages:

1. Firm scleral anchorage.
2. Whipstitch fixation of each muscle margin.
3. Splint-like support of the muscle by parallel lines of suture laid across the superimposed conjunctiva, capsule and muscle, all of which are advanced together.
4. Straight traction on both muscle edges.
5. Graduated control while the suture is being tied.
6. Single suture, removable externally.
7. Tucking or crumpling of the muscle without an unsightly knuckle.
8. Reposition of the globe thru advancement of the capsule.

In view of the simplicity and bloodlessness of this operation, it is to be recommended if one may judge by the brilliant result in the case exhibited. The added power to the sutured muscle may be explained thus: the suture draws the belly of the muscle forward over its insertion so that eventually by absorption of that part of the muscle the muscle is shortened.

Xerosis Epithelialis.

DR. HOLLOWAY, after referring to the various clinical manifestations of xerosis, reported the case history of a colored boy, aged five years, who was first seen at his clinic at the Wills Hospital on April 4, 1920. He had expected to exhibit the patient but an incorrect address was given. No accurate determination of the visual acuity could be made, but in the absence of any pathologic fundus findings, perfectly healthy and clear media and no decided error of refraction, this was assumed to be good.

On each side of the cornea there was a triangular pigmented area with its base at the limbus. Over the greater portion of this area there was a whitish foamlike substance that could be dislodged by the lid margin or applicator. When free from this substance the area was roughened and rather dry. A uniform brownish pigmentation swept around the lower limbus of the cornea, and beginning at the internal canthus there was a well defined streak of delicate brownish pigmentation extending along the fornix of the lower lid to a point well below the cornea. In appearance this suggested, at first glance, an argyrosis, but was doubtless congenital.

Dr. Holloway referred to the observations of Stephenson and Hepburn. In conclusion, he stated that he was confident that our experience with this condition in this country, at least in Philadelphia, was distinctly at variance with that of some of the English observers in regard to its frequency. In Philadelphia it was really a very unusual clinical manifestation.

DISCUSSION. Dr. Zentmayer said: The only case of xerosis of the conjunctiva of this type that he had seen was in the eyes of an infant. The condition was similar to that in Dr. Holloway's case. The child was malnourished in the opinion of Dr. Louis Starr from congenitally deficient pancreatic secretion. Death occurred at the age of about three months.

Unusual Case of Xanthelasma.

DR. J. MILTON GRISCOM exhibited the photograph of a case of xanthelasma of interest because of the extreme size of the growths and the distinct hereditary tendency to this disease in her family. In the right eye the tumors measured 28 x 12 mm. on the upper lid and 20 x 7 mm. on the lower lid. In the left eye the growth on the upper lid measured 25 x 7 mm. and on the lower lid 17 x 6 mm. There were two small nodules at the external canthi of each eye measuring 3 mm. each. The main growths had a nodular, uneven surface and were elevated from 3 to 6 mm.

Complete excision was performed, with excellent cosmetic results.

Dr. Griscom had not been able to find in the literature of the past fifteen years any record of a case so extensive, and he had not found any reported cases of a hereditary character.

Neoplastic Degeneration of Cornea.

DR. BURTON CHANCE presented for diagnosis the case of a woman exhibiting colloid epithelial masses on each cornea. There were two masses on each situated symmetrically midway between the lower limbus and the summit, at about the vertical diameter. These masses were approximately 2 mm. in diameter, and elevated, very much in the manner of herpes, but of a doughy white appearance. They were without inflammatory symptoms, and had occasioned only itching and slight burning sensations. Over a period of three weeks' observation, on alternate days, no changes occurred in the masses or in the surrounding tissues. The eyes were not otherwise affected, but the glandular structures of all four lids were congested and more or less tumid. For many years the patient had suffered from redness of the skin of her face which has in recent years become gradually and steadily less, but which has left her skin rough and the pores prominent. She presents the aspect of one who has recovered from acne rosacea. There had been no stunted or inturned eye lashes observed rubbing against the corneas. From each cornea the somewhat larger of the masses was excised by shaving with a Graefe knife. The underlying corneal membrane was found to be entirely unaffected. The histologic study has not yet been made. Treatment so far has consisted in applications of boroglycerid to the lids of the left eye, which applications have very greatly improved the health of the lids. The left cornea is now entirely clear. As the process gave no special annoyance nothing was applied to the right in order to observe the process of the affection. The patient has been taking sodium hyposulphit, 15 grains, in capsule, three times a day. Dr. Chance does not regard the case to be

one of herpes, but believes it to be an accompaniment of acne rosacea.

DISCUSSION. Dr. Zentmayer said he had never seen a degenerative process as a complication of acne rosacea. He had recently seen in a man, aged fifty-five years, a hyalin degeneration in the cornea starting as small, rounded, elevated, porcelain like spots not more than 1 mm. in size. He thought it probable that Dr. Chance's case was of a similar nature.

Neoplastic Degeneration of Iris.

DR. CHANCE showed the case of a man who reported for the relief of an ulceration of his left cornea, in whose right eye was found a bluish gray mass in the iris filling the angle of A. C. at the nasal side, on the horizontal meridian. The circle of the pupil showed a notch at the site of the mass, and on full mydriasis the mass projected well into the pupil space. There were no signs of inflammatory reaction and there was no pain, the man being unconscious of the presence of the mass. Tension of the globe was not increased. Dr. Chance offered it as a case of melanosis, which is at present benign, yet he is not without the fear that it might become malignant.

DISCUSSION. Dr. Edward A. Shumway said that he thought Dr. Chance's case should be considered one of melanosis of the iris of unusual size. The patient had said, on question, that the spot had not increased in size but that it was a condition that demanded careful watching lest it develop into a malignant growth.

Unusual Type of Atrophy of Choroid.

DR. CHANCE also exhibited a case of extensive atrophy of the choroid in each eye. The left eye presented elliptical vacuolate figures in the stroma, in the bottom of which were the worm-like vessels of the choroid. Considering the extent of the process the fundus was singularly free from pigmentation.

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NEW YORK ACADEMY OF MEDICINE

Section of Ophthalmology

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DR. A. E. DAVIS, Chairman

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Injurious Effects on the Eyes of Various Toxemias.

DR. W. H. WILMER, of Washington, D. C., by invitation read a paper on this subject. After an extremely interesting review of the literature of the subject, both earlier and recent, a case was reported in detail; on account of the unusual good health of the patient, the long continuance of the trouble, the negative reaction to the subcutaneous injection, and the final improvement as the result of the therapeutic administration of tuberculin.

J. B. W., 25 years of age, first consulted the writer on February 3, 1920. He gave the following history: Recurrent attacks of iritis in the left eye during 1913 and 1914. In March, 1915, noticed large floating specks in front of the left eye. They gradually became larger until a month later, when that eye became practically blind. An oculist found the vitreous of the left eye filled with blood. A few months after loss of sight of this eye, black specks appeared in the right eye, later taking the form of long floating lines. In August, 1917, a large hemorrhage occurred in the retina of the right eye. This became absorbed after two months' stay in a hospital. The small hemorrhages have continued to occur up to the present time, causing both visual disturbance and great apprehension.

The patient said: "I have been thoroughly examined and the doctors cannot find any cause for the trouble. I am not a bleeder." He was robust and athletic. Tonsils removed two years ago. Sinuses reported clear. Two suspicious teeth have been extracted.

R. Thrombosis of a branch of superior nasal vein, inferior temporal vein, and of a vein in the extreme nasal

periphery, on the level with the disk; white infiltrates around thrombi; perivascularitis, many minute hemorrhages scattered thru the fundus, especially near the site of the upper thrombus. Numerous dark brownish discolorations in the lower portion of the retina over the ora serrata—evidently the remains of previous extensive hemorrhages. Vitreous clear.

L. Scar in retina and choroid above the macular region, with a dense band of organized fibrous tissue in the vitreous stretching horizontally over the macular region and papilla, constituting a retinitis proliferans.

The left tonsil had been removed and there is a small portion of the right tonsil left, otherwise the findings were negative; except X-ray examination of the chest shows rather marked infiltration at both hila and some thickening along the main trunks, extending to the lower lobes of both lungs. The appearance is that of an inflammatory process beginning at the hila. The exact nature of the process cannot be stated, but the appearance is not that of tuberculosis. Von Pirquet negative.

Tonsillectomy was done, and the retinal picture being typical of a local tuberculosis (in spite of the infected tonsil and the negative Von Pirquet) on February 29th tuberculin (O.T. human type) 0.5 mg. was injected subcutaneously. Slight general and local reaction. March 4th, tuberculin 1.25 mg. Marked general, focal, and local reaction. After this therapeutic doses of tuberculin were given twice a week,

beginning with $\frac{1}{1000}$ mg. and increas-

ing the dose each time by $\frac{1}{1000}$ mg.

The condition is improving and the patient feels that the vision is clearer.

Since the second provocative injection there have been no more observable fresh retinal hemorrhages, and the white areas of infiltration have cleared up markedly. Altho the patient was in splendid condition before, he has gained ten pounds, and is feeling most hope-

ful about the future outcome of his case.

Another type of tuberculosis of the retina was seen in Mrs. P. W. B., 26 years of age. She was rather thin and anemic. All of the tests made at her home had been negative, except for the report of a chronic cholecystitis. Dr. W. S. Franklin wrote: "Right fundus: Nerve head slightly blurred, nasal margin. Numerous grayish streaks follow the peripheral arteries some of which are obliterated. In the lower quadrant, two large masses of exudate are suspended respectively 3 and 5 mm. anterior to the retina. Left fundus: Nerve head clear. Five grayish streaks following the ora serrata (nasal side.)"

R. E. V. = $\frac{20}{40}$; L. E. V. = $\frac{20}{20}$

Dr. J. W. Lindsay gave injection $\frac{1}{10}$

mg. of $\frac{1}{1000}$ O.T. Several hours later,

chill, general pains, headache, nausea, faintness, local soreness at site of injection, temperature reached 102.4 degrees. There was also an increase of the local disturbance particularly in the right eye. The patient returned to her home with suggestions in regard to hygiene and therapeutic administration of tuberculin. The mother of the patient wrote recently that the daughter's last visit to her oculist "encourages us all. He reported a very marked improvement in the condition of the eyes, said the white streaks were rapidly disappearing, and he was convinced that we were on the right track."

However, cases of recurrent retinal hemorrhages are not all of tubercular origin. The writer saw a young man

of 24 whose vision was reduced to $\frac{1}{200}$

from recurrent hemorrhages in the vitreous. All sources of infection in this patient were excluded except the teeth and the intestinal tract. The patient, however, suffered markedly from constipation and had a bad case of pyorrhea alveolaris. Upon the re-

removal of the source of infection, within seven months, the vitreous entirely cleared up, leaving a normal vision. There has been no return of the hemorrhages.

Dr. Wilmer spoke briefly of the eye lesions which can follow *antityphoid inoculations*. A careful study of this type of toxemia is of great importance owing to the far-reaching economic and medical values of the inoculations themselves, and also because it is not recognized generally that there is a possibility that affections of the eye may occur after the inoculations.

After reference to the literature of the subject, the following case was reported. P. E., 23 years of age, had served two years in the navy. He was not inoculated upon entrance into the service, but he was given a lipo-typhoid injection upon his discharge March 22, 1919. He gave a history of a right-sided mastoid lesion three years ago, removal of tonsils in January, 1917, and extraction of bad teeth and scraping of bone fourteen months ago. At the time of the inoculation, there was a history of a cold with evidently a sinus involvement. Immediately after the inoculation, there was a general reaction. The right eye became badly inflamed. As the inflammation disappeared, patient noticed that there was a central blind spot. Shortly afterward, he began to have trouble with the left eye—seeing “whirligigs,” etc.

Present examination R. V. = 10/200 eccentric; L. V. = 20/15. Pupillary reaction normal. Blind spot markedly enlarged. Fundus of right eye, a central spot of chorioretinitis surrounded by small hemorrhages. In the left eye, two small peripheral spots of chorioretinitis, each one adjacent to a retinal artery. Dr. Joseph H. Bryan reported: “Marked chronic bilateral maxillary sinusitis with an acute exacerbation; deflected septum to right which interferes with drainage from right sinuses. Operation indicated.” That this eye condition was due to the inoculation, is reasonably probable from the fact that a marked general reaction followed, and that the eye complication occurred immediately after the injection.

In reviewing the literature of the toxemias in the light of one's own experience, there are some facts that stand out with especial prominence; and Dr. Barker's advice to the internist is equally valuable for the ophthalmologist in his search for the cause of some obscure ocular affection. He says: “In looking for focal infections, I think the practitioner will be helped if he remember that most often in children the primary focus is in the tonsils or adenoids, and that in older people it is more often the teeth, paranasal sinuses, or the gall bladder.”

However, the source of infection is often a mixed one, such as a combination of teeth and tonsils, tuberculosis with cholecystitis, etc. Certain portions of the intestinal tract, with its abundance of lymphoid tissue, serve as important sources of toxins. Whether this is primary, or secondary to sepsis in the mouth or throat, it must be investigated in every case.

No part of the eye is immune from the possibility of damage from some toxic process in a distant part of the body. It is the writer's conviction that improved laboratory methods will show that the relationship between lenticular opacities (even in older people) and some focal infection, is a closer one than is now believed to exist. Dr. Wilmer had recently seen a number of cases of an interesting group, the ages of the patients varying from 32 to 40 years, all cases showing the common feature of a milky-looking lens, a discolored iris, and an increase, or marked decrease, in intraocular tension. The apparent cause of the original low-grade uveitis in these cases has been oral or tonsillar sepsis, or both.

Pathologic conditions of the organs of internal secretion—tho secondary to some distant source of toxemia—have an important bearing upon some types of inflammation of the uveal tract.

In some cases of retinal hemorrhage in people over fifty years of age, some focus of infection, as the teeth or tonsils, gives an ophthalmoscopic picture resembling an arteriosclerotic process. But the hemorrhages and white degener-

erative plaques clear up remarkably after the complete removal of the septic source. This improvement is often accompanied by a lowering of the general arterial hypertension.

It is very necessary for the ophthalmologist to be able to interpret in a general way the X-ray findings in regard to the teeth, so that he may co-operate with the dental surgeon by advising the best method of procedure in dealing with certain types of oral sepsis. For example, when there is an apical abscess at the root of a surviving molar that is being used as a pivot for bridge work, the ophthalmologist must be able to decide, not only that the eye lesion is sufficiently serious, but that the picture is sufficiently clear-cut to warrant the sacrificing of that important tooth. There is a tendency in one school to extract all suspicious teeth, while the opposite school depends too much upon expectant treatment. It is well to remember that in the case of the eight upper central, and the six lower central teeth, apical abscesses can be removed and the teeth saved by the surgical procedure of root resection.

In adults, the only reliable test for ocular tuberculosis is the subcutaneous injection of tuberculin—preferably old tuberculin. The necessity of giving very small curative doses at the start, is emphasized by all ophthalmologists of large experience. In most cases, the therapeutic injections of tuberculin are very efficacious when accompanied by the proper regimen and hygiene.

In typhoid inoculations in civil practice, it is wise not to give the inoculations as long as there is any evidence of the existence of any focal infection.

It is a clinical fact that often non-syphilitic lesions of the uveal tract are favorably influenced by antisyphilitic treatment. Also, long protracted lesions are helped by the administration of the extract of certain glandular organs—such as the thyroid extracts. However, the contrary is also true. The writer had seen a few very severe cases of plastic uveitis following large doses of thyroid extract self-administered for the reduction of flesh. In every case the general nutrition suf-

fered severely with the rapid reduction in weight.

In all toxemias, in addition to the suggestions regarding hygiene, the gastro-intestinal tract must receive attention both in regard to diet and therapeutics. The writer would emphasize strongly the application of these measures while the source of the toxin is under investigation.

DISCUSSION: Dr. Warfield T. Longcope: One may regard the presence of focal infection perhaps from two related points of view. First: From the standpoint of preventive medicine, and second: From the standpoint of therapeutics. It is generally recognized that a large proportion of individuals do suffer from focal infection over a period of weeks, months, or years, sometimes during the course of their lives, and only a certain proportion show any ill effects. On the other hand, evidences are accumulating to show that there is a direct relationship between focal infections and such conditions as chronic arthritis, endocarditis, or, as Dr. Wilmer has so well pointed out, a variety of pathologic changes in the eye. The latent danger, therefore, to patients carrying focal infections, is sufficient indication for removal if possible, of such foci.

It is, on the other hand, very difficult to determine in any given case the exact relationship between focal infections and the systemic diseases, especially since the lesions are not specific either in pathology or etiology.

Dr. Nellis B. Foster said: Some of the questions which Dr. Wilmer had been forced to pass over rather cursorily were of very profound significance, and went to the roots of questions of pathology. All knew how frequent focal infections were. Beyond a certain period of life it was doubtful if any of us escaped, and so we must postulate a second factor, namely, individual predisposition, since some individuals maintain robust health in spite of these known foci.

As was known, the great majority of persons inoculated with antityphoid vaccine showed only slight and transitory symptoms, a little fever, malaise,

and slight muscular stiffness. But there was a small minority in which quite a definite train of graver symptoms developed. To one of these types he wished to call attention, because these were the cases that showed a type of reaction that might be called purpuric. The manifestations in these individuals were first, a purpuric rash such as one saw typically in cerebrospinal meningitis. The rash appeared twelve hours after inoculation and was associated with fever and might be associated with hemorrhages.

In some cases there were only a few hemorrhagic spots on the skin, along with hemorrhage from the kidneys or intestines and epistaxis. If hemorrhage occurred in skin, kidneys, or intestines, it stood to reason that it might occur in the central nervous system, and he had seen one case in which it did occur, causing a transverse myelitis, and a number with meningismus. We had here again exceptional individuals with unusual predispositions.

These hemorrhages in the retina, or elsewhere in the body, were due either to changes in the blood vessels or changes in the blood. We knew at the present time no other cause for hemorrhages, except changes in the endothelium of the arteries, and changes in the blood itself. The hemorrhages that Dr. Wilmer mentioned as occurring in the eyes of young men could be explained in no other way. Cerebral hemorrhages were not at all a rare thing even in children. It is thought such hemorrhages were explained by the effect on the blood vessels of past infectious disease, perhaps a trivial disease of childhood. If, as sometimes happened, these cerebral hemorrhages were so severe as to cause death, it seemed not at all an incorrect deduction that they might occur in the small vessels of the eye, because the eye is in fact a projection of the central nervous system.

One other point which Dr. Foster discussed was in regard to the treatment of uveitis with thyroid. A good many ophthalmologists seemed to believe that many disturbances of the eye were of endocrine origin, and thyroid extract was recognized as the one mode

of approach in the treatment of uveitis. He had been somewhat puzzled over that fact and thought that the supposed benefit of that treatment was due to other causes than that suggested. Uveitis was a disease that progressed in waves, and the period of improvement might conceivably be coincident with the administration of thyroid extract.

Another reason might be that small doses of thyroid were stimulating, and brought about improvement like that by a change in climate; so that the improvement of uveitis which occurred in individuals who were subnormal in health could be explained on those grounds. While improvement in uveitis might occur under the administration of small doses of thyroid, it was inconceivable that large continued doses of thyroid extract should cure the disease. The assumption of a relationship of some other obscure diseases of the eye to other endocrine disturbances, so called, seemed to him simply a mask for our ignorance.

Dr. Robert G. Reese said, the relationship between toxemias and diseases of the eye is a complex one, and unfortunately the clinical picture is by no means characteristic. We are apt, on account of our wonderful successes, to forget there are other etiologic factors in diseases of the eyes and adnexa.

While it is true that all diseases of the uveal tract are either of septic or toxic origin, the successful elimination of these agents is often perplexing. The history was quoted of a woman 50 years old with bilateral uveitis of eight years' duration. She received tuberculin, subconjunctival injections, and antiluetic treatment. The tonsils and some abscessed teeth were removed. General examination showed Paget's disease, aortitis and colitis. The patient is at present getting streptococcus vaccine, arsenic, and salicylates.

Dr. George H. Bell: Toxemia from food intoxication, bad teeth and tonsils, is the most important subject before the medical profession today. From time to time in the last ten years, I have called the attention of the profession to the fact that modern dentistry is producing more disease than any

other cause. What are the causes of toxemia and what are its effects on the eye? If we exclude syphilis and gonorrhea, I believe that all the eye conditions that we see, are caused directly or indirectly by focal infections, and the three most potent ones are bad teeth and tonsils, and food intoxication all of which can produce a general toxemia, which may have a local manifestation in the eye, in the form of uveitis, choroiditis, iritis, episcleritis, optic neuritis, and keratitis.

Dr. James G. Dwyer wished that more of the statistics of the various types of cases had been brought out. He wished to speak of the various types of infections, and bring out some of the points that had impressed him during the last ten years. From a personal experience of over twenty thousand Wassermann reactions done during the last seven years, and from an investigation of over one hundred and fifty eye cases of so-called focal infections, he wished to say the following:

First: Syphilis. The diagnosis of syphilis of the eye is comparatively easy, as the above experience has shown, that in the vast majority of syphilitic eye cases, the Wassermann reaction is reliable, as the lesion is so situated that a positive reaction is easily obtained.

Second: Tuberculosis. Regarding tuberculosis, the intracutaneous test, in contradistinction to the superficial skin reaction, has proven in the last two years to be thoroly reliable, as an evidence of active tuberculosis and can be followed by the subcutaneous test, care being taken to carry out this latter test thoroly.

The big questions arise as to the focal infections from the teeth, tonsils, intestinal tract, and other occasional foci, and this is where we need light.

His experience leads him to believe that the laws of physics relative to a fluid under pressure, was a very important factor. Focal infections were more apt to occur under such conditions, as an apical abscess at the root of a tooth, with the pus in a closed cavity under pressure, than in pyorrhea, where there was an open infec-

tion. The same was true of old fibrous tonsils with pus shut up in closed crypts, or in tonsils that had undergone partial removal, where the mouths of the crypts were closed by scar tissue. The same reasoning applied to the intestinal tract or to the prostate gland.

Dr. Walter B. Jamies: Whatever specialty we may be practising, we have come to realize that focal infections, and indeed the other intoxications, have a far-reaching significance. While the expectation of human life has increased very greatly during recent years, and entirely thru the efforts of the medical profession, it is generally admitted that this increase has been brought about by improvement in the mortality rate of infancy and childhood, rather than because of any well marked impression made upon the death rate from the diseases of later life.

Dr. Wilmer's paper suggests quite a different point of view towards the diseases of later life from that which has obtained before. It has been customary to assume that when a man of middle life has a disease, for instance, of the kidneys or of the heart or of the joints, and when by the use of instruments of precision and careful diagnostic methods we have located the lesion and told him that his symptoms are due to Bright's disease, hardening of the arteries or sclerosis of the heart muscle perhaps, and have made a prognosis telling him how long he has to live, we have been wont to feel that we have done our duty. Today, fortunately, we are taking less interest in the minutiae of physical diagnosis and are giving more attention to the study of the ultimate origin of the disease in the individual case.

Physicians used to ask a man of fifty or sixty who was suffering from Bright's disease or other organic trouble, what his father died of. When he replied, dropsy at the age of sixty, the physician would say, this is about what you have to expect. We used to ask a man if he was a hearty eater and if he replied that he was, we ascribed his trouble to eating too much; if he

said that he was a very light eater, we perhaps attributed it to too little nourishment. We asked him if he was a hard worker and generally his wife answered that her husband had always worked himself to death, and then we said no wonder you have a chronic disease. As a matter of fact, it is a matter of much doubt whether people do get Bright's disease or heart disease because they work too much or too little, or eat too much or too little, and we are not at all sure now even that alcohol has played as important a part in the causation of diseases of middle life as we had once thought.

Therefore this modern conception of medicine and diagnosis and its purpose as presented by Dr. Wilmer this evening, is intensely interesting; and applies to every branch of medicine and to the diseases of the body and the mind, for even in mental diseases it is becoming more and more clear that the body, and the entire body, should be searched for causes of the malady. There is probably a definite cause for every kind of disease and we should demand to know this cause if it is discoverable by any means at our command, and if we cannot discover it, we should honestly admit that the fault is our own.

One of the great difficulties of course in treating diseases of middle life is that we are apt to find that they are not simple but very complicated. The late Dr. Jacobi, in his delightful way, once told me that he preferred to treat children rather than adults, because almost invariably a child has but one disease at a time, whereas adults rarely have only one.

The profession should accept the principle that when an individual manifests any departure from the normal in any function, the making of a diagnosis in the old-fashioned sense is only the beginning; that there is a definite cause for this disturbance and that this cause should be sought by every means that medical science offers.

Dr. Reese regretted that Dr. Wilmer said nothing of his failures. Like the rest of us he has had at his command only such knowledge of physiology, pathology, and causation as medical science of to-

day offers; and while he has pointed out to us that many cases of serious organic diseases of the eye have a remote physical cause in some part of the body, perhaps far distant from the eyes, yet there are doubtless other causes of these same eye lesions which are not accessible to us today, but which will certainly be accessible to the physician of the future. Of course chronic rheumatism, as well as eye lesions and probably a good deal of vague ill health without definite local complaint, are caused by foci of infection in the teeth and tonsils; but we have all seen plenty of cases of this type where the disease went on just the same, after the teeth and tonsils were removed. I have seen a number of cases of very obstinate rheumatism of the rheumatoid arthritis type, in persons who had completely recovered from a pulmonary tuberculosis, usually with some cavity formation and in whom no local cause could be found in the teeth or in the tonsils, and in whom it seemed at least possible that the intoxication came from a healed cavity at the apex of the lung which gave few or no symptoms of the ordinary type.

Then there is the alimentary canal, especially the colon and the ileocecal valve, offering possibilities of ill health from intoxication; but this is a chapter which is always vague and upon which a great deal of work still remains to be done.

Dr. W. H. Wilmer in closing the discussion said: Unfortunately one cannot always report cures; for the fact must be borne in mind that all cases cannot terminate favorably, even where the toxic source has been discovered, on account of the damage already done—as in the case of a central choroiditis, or retinitis proliferans.

When the influence of oral sepsis upon the general system was first appreciated there was a tendency to sacrifice teeth recklessly. There is always a tendency for the pendulum to swing just as far the other way. The middle course is generally the right one.

Undoubtedly apical abscesses are far more dangerous as a source of toxemia

than pyorrhea alveolaris. But he is convinced that some ocular lesions occurring in his practice have been due to

pyorrhea alveolaris, when the process has been extensive and the patient's resisting powers have been lowered.

ABSTRACTS

A. Mazzei. Action of Hormones and Alkaloids on the Irides of Dogs After Extirpation of the Superior Cervical Ganglion. Arch. di Ottal. v. 26, p. 249.

The author extirpated the superior cervical ganglion on one side in five dogs, and tried the effect of various substances on the iris, using the other eye as a control. The substances were administered by the vein, except pilocarpin and cocain, which were instilled in the conjunctival sac.

Adrenalin produced immediate mydriasis on the operated side, and no effect on the iris of the other eye in eight experiments. This agrees with the observations of Meltzer and Auer, and must be due to removal of the inhibition which the ganglion exerts on the dilator iridis, allowing the adrenalin to act.

Endospermin produced miosis on the operated side, slighter miosis on the other side.

Chloral hydrat produced mydriasis in both eyes, more marked on the operated side.

Atropin produced mydriasis in both eyes, much later on the operated side.

Cocain by the vein, and by instillation in the sac, produced prompt and complete mydriasis on the unoperated side, while the mydriasis was later and incomplete on the operated side. This affect and that of atropin are due, apparently, to the cutting off of the innervation to the dilator.

Pilocarpin instilled in the sac, and injected into the anterior chamber, produced miosis on the operated side 15 to 20 minutes sooner than on the unoperated side.

Endovarin, Witte's peptone, and sodium nitrit were without effect on either eye. S. G.

Rasquin, E. Syphilitic Irregularity of the Pupil. Ann. d'Ocul., 1920, v. 157, p. 162.

The author studied 824 cases of pu-

pillary irregularity of distinctly syphilitic origin, and not caused by adhesions. One hundred seven cases showed an elliptical or oblong pupil, usually oblique. Anisocoria was present in all but 3 of these cases, and 96 showed alterations of the pupillary reflexes. In 647 cases, there was an irregularity with large angles. The margin has the appearance of a polygon with numerous curved sides of unequal length, and forming obtuse angles with each other. This form may be found at any stage, usually preceding the other form, may be independent of all other pupillary symptoms, without anisocoria, usually affecting both eyes. Seventy cases showed forms which could not be classified. They are usually accompanied by anisocoria and disturbances in the reflexes, and often accompany old syphilis. C. L.

Gallemaerts, E., and Kleefeld, G. Microscopic Study of the Living Eye. Ann. d'Ocul. 1920, v. 157, p. 129.

The authors continue the description of their findings by the aid of the corneal microscope of Czapski, and the Nernst light (see A. J. O., July 6, p. 538). The present article deals with the conjunctiva, sclera, anterior chamber and irido-corneal angle, and iris. It is illustrated by 6 colored plates and one black and white, chiefly of the iris.

THE CONJUNCTIVA. (1) The bulbar conjunctiva in general was examined usually by means of indirect illumination, the arm of the lamp making with the axis of the microscope an angle much greater or less than 45 degrees. The tissue is smooth and reveals nothing to the microscope, except in the case of senile changes.

(2) The *Blood Vessels* are slightly tortuous. The circulation can be easily seen. It may be studied with yellow or white light, but the most beautiful pictures are obtained with a red free light. The blood column is black on a slightly

greenish background. The caliber of the vessels varies and microscopic nevi are not rare, near the limbus as well as elsewhere.

(3) The *lymphatics* are best studied with an orange-yellow light. But some details are seen better with a red or a green light; also, when there is a lymphatic stasis, either spontaneous, or produced by lymphogogic substances. Then there is seen on the conjunctival surface an infinite number of small polygonal, slightly tinted figures, with clear contents. Deeper down are long, white, straight vessels, sometimes ramifying. There is also a distinct system of lymphatic canals, arranged similarly to the blood capillaries. The lymphatics are in relation with those at the limbus.

(4) *Lymphatic varices* are frequently found in middle aged people in the form of small elevations of the conjunctiva; with a tendency to rupture easily, but quickly cicatrizing.

(5) *Hyposphagma* shows a large red colored area traversed by blood vessels, whose tract is distinctly separated by a clear area.

(6) In *argyrosis* small areas of reduced silver are found along the perivascular lymph spaces.

(7) *Pigmented nevi* are found at the limbus or elsewhere. At the limbus they are formed of small pigmented areas, arranged along the lymphatics, often following the course of a blood vessel. They are always linear and never diffuse, which distinguishes them from the pigmented nevi of diffuse sarcoma. The granules are usually arranged around the capillaries, whose course they outline. The nevi elsewhere are diffuse. There is a regular distribution of the granules along isolated lymphatics or in the perivascular spaces.

(8) In *melanosarcoma*, the pigment granules invade the perivascular sheath and collect around the vessels, proving their dissemination by way of the blood vessels. The vascularization is much greater than in nevi, but the diagnosis between the two is difficult. The extension of the melanosarcoma can be followed in vivo, also it is seen that the diffusion of the cells is much greater than is microscopically apparent; justifying

those who advise enucleation of the eye and partial exenteration of the orbit in such cases, and explaining the recurrences when this is not done.

(9) *Lymphosarcoma* is seen as a warty, telangiectatic, lymphatic mass, sharply demarked from the cornea, containing a little pigment.

(10) *Pinguecula* is a yellowish vitreous looking elevation.

(11) *Xerosis*, even by slight magnification, is seen as a crayon-white, limited elevation, full of air bubbles, which are easily moved. Under stronger magnification, it is seen to be a hyalin degeneration of the cornea, containing fissures for passage of blood vessels.

SCLERA. The structure can be made out in albinos, and in patients with bluish sclerae. The superficial layer is formed of fibres parallel to the limbus; in the deeper the fibres are perpendicular to these. In the sclera are numerous grooves, giving passage to veins only. There are accessory grooves giving passage to arteries or veins, the latter sometimes leaving thru the principle groove, and reentering thru an accessory. A case operated on by sclerectomy, showed 15 days later that the perivascular lymph spaces were decidedly distinct, proving a filtration via the lymphatics, provided this condition were permanent.

ANTERIOR CHAMBER AND IRIDOCORNEAL ANGLE. The examination of these, especially of the latter, has not been satisfactory. The normal anterior chamber shows practically nothing, but the pathologic shows three kinds of elements, white and red globules, and pigmented. The white globules are small round discs, with a tendency to collect on the posterior surface of the cornea in an irregular manner. The red ones vary in number, are of a pale vermilion color, but other details cannot be made out. The pigmented elements are numerous kinds; large round, yellowish brown, others almost black, small and ill defined, and others like fine powder.

IRIS. There are four divisions of the iris, the ciliary, the sphincter, the margin and pupillary membranes; and these should be examined in both mydriasis and miosis. In medium dilatation of the pupil (4-5 mm.), the first shows a super-

ficial and a deep fibrillovascular layer. The second shows a superficial layer, a fibrillovascular one and the sphincter. The uvea is visible in the third division, especially in ectropium. The tissue, as a whole, is formed of delicate elements separated by very loose tissue, thru which the posterior epithelium can be seen.

Dilatation of the pupils makes the radial elements shorter, thicker, and more sinuous. The crypts, formerly elongated lozenge shaped, become shorter with sinuous margins; and disappear almost completely in the sphincter region during mydriasis. The fibrils extending from the root of the iris to the sphincter, are of greyish color, cylindric, and ramify, forming lozenge shaped spaces. In the axis of a fibril is an arteriole which subdivides like the fibrils, the ramifications forming the circulus arteriosus minor. The spaces mentioned above are for the most part filled with more delicate fibrils, lying in different planes.

The superficial layer is more difficult to study on account of its extreme delicateness. Its presence is shown by the normal chromatophores or by siderosis. The pigment areas are formed by accumulations of pigment of varying colors, their delineation being marked by the fact that their surfaces are covered with bristle like bodies of variable lengths. The margin is distinctly outlined by a groove, and is formed of a series of reddish brown projections. They are scalloped and sprinkled with brownish points and are of different sizes.

In ectropium uveae, there is a large brownish area which invades the anterior surface of the intracoronary zone. The frequency with which remnants of the perilenticular vascular wreath are found is astonishing. Their forms and size offer the greatest variety. They never show adhesion to the intracoronary zone. These remnants may lie in the pupil and may be accompanied by congenital cataract. They are of stellate shape and may be so numerous as to look like a starry sky.

Iritis. The first sign is hyperemia which is shown by the appearance of numerous vessels in the fibrils. This is seen better in blue than in brown eyes, as the pigment is so dense in the latter

as often to hide them. It is not a question of alteration in the anterior layer in acute iritis, altho such has been considered classic.

Tubercles and Gummata. Nodules of an orange yellow color appear in the trabeculae. They are nourished by vessels from the trabecular branches, which have an irregular ramification. In tuberculosis, in addition to large ones, microscopic tubercles are found in the region of the margin, composed of small, oval yellowish masses, which push aside the trabecules and project into the pupillary area. Neither the margin or the posterior layer show any changes. In very acute cases, with hyphemia, petechiae are found on the anterior surface of the iris.

Atrophy of the anterior layer. At the end of the acute stage are found migration of pigment cells into the crypts and sclerosis of the trabecules with anemia, so that the fibrils look like greyish filaments of irregular caliber.

In an advanced stage of degeneration, after chronic iritis, the iris assumes a shaggy appearance and usually an orange brown color, due to dissemination over the entire surface of brownish masses of pigment. Sometimes there is simple atrophy without migration of pigment, when the fibrils look like rigid tracts extending from pupil to periphery. At the margin, there are inflammatory remnants, adhering to the lens, and an abnormal translucidity of the iris tissue.

Atrophy of the posterior layer. Chronic iritis reduces the margin to a fine, sclerosed transparent membrane. These changes are the same as those on the posterior layer. The anterior surface may appear normal, but the posterior, by indirect illumination, shows the above changes. This is important on account of the possibility of making a diagnosis.

Inflammatory pupillary membrane. In mild, properly treated cases of acute iritis, the deposits on the lens are greyish masses, sometimes striated, sometimes containing fragments of uveal tissue, and extending to the center of the pupil. Since the margin never extends that far, this debris must be carried there either

by white cells, or by the retraction of the exudate.

In improperly treated iritis, there is rarely complete occlusion of the pupil, as there are usually a couple of places where the fluid can pass. The membrane is an extremely thick one, with striations concentric with the pupillary margin of the iris. When synechiae are formed, in spite of the use of atropin, and the pupil is dilated as much as possible, the membrane forms a mobile veil binding its fixed part on the lens to the margin. Sometimes the anterior chamber is full of exudate very rich in fibrin, adhering to the iris and giving the impression of a congenital pupillary membrane. The diagnosis is made from the history, and the presence of iridal degeneration at the margin. In long standing cases of iridochoroiditis, this membrane curves over the surface of the iris into the exudate.

GLAUCOMA. In the preglaucomatous stage, there are no symptoms. In acute and chronic, the following are found:

(a) *Cornea.* The changes are those described under the head of edema. In general, there are subepithelial, microscopic bullae of polygonal shape, which in chronic glaucoma soon became visible to the naked eye.

(b) In the anterior chamber, the only changes are some brown pigmented elements on the posterior surface of the cornea.

(c) *Iris.* In acute glaucoma, there is ectropion uveae, soon followed by areas of atrophy of the anterior surface of the iris. There are microscopic white areas due to sclerosis of the trabecular vessels, with almost complete disappearance of the tissue in front of them. Instead of small crypts, there are large cavities of slight depth, due to general atrophy, which are crossed by delicate, rigid, greyish trabecules. The region of the sphincter can not be made out. The margin has a vacuolated appearance. The pupil is covered with numerous brown pigment granules, and the posterior surface of the iris shows large lacunae. The vitreous is invaded by exudate and pigment granules.

HETEROCHROMIA. (a) Congenital. It is rarely complete, blue eyes showing pig-

mented areas, and brown areas where the pigment has not invaded.

(b) Postinflammatory. Here and there a large trabecular vessel is visible; but most of the surface has assumed a flaky appearance, and is studded with small plush like points. The margin shows numerous vacuoles, and indirect illumination shows a foamy posterior surface.

CONGENITAL HYDROPHTHALMOS. In one case, there were false folds of the posterior surface of the cornea, some in the form of a V. Direct illumination showed an opalescent horseshoe shaped opacity, which by indirect was resolved into fine parallel striae. The external limit of the rest of the iris is represented by successive fragments of trabecular tissue. The anterior surface of the iris is shaggy, atrophied, with a greyish appearance, and allowing the sphincter to be seen.

SIDEROSIS OF THE IRIS manifests itself in two ways:

(a) Alteration of structure. This consists in an atrophy of the iris of varying kinds. Sometimes the anterior layer has a shaggy appearance, without visibility of the fibrils. Sometimes there is an extreme thinning, to the appearance of a membrane, where an occasional trabecular vessel can be seen, sometimes greatly dilated. The posterior layer, as well as the margin undergoes a pigment atrophy.

(b) Incrustations. It requires careful attention to make out the grains of metal and iron salts, which are easily mistaken for pigment granules. They are, however, a little blacker and rounder. They are distributed over the whole iris surface, but especially in the crypts.

COLOBOMA OF THE IRIS. In the congenital, the anterior layer stops abruptly, the trabeculae curving towards the root of the iris. There usually is a bridge of tissue covered with pigment, connecting the two pillars. The margin terminates in a sharp border.

Operative coloboma shows a distinct section of the iris. The margin terminates abruptly in a perpendicular border. There are islands of depigmentation, and sclerosis of the trabecular vessels near the coloboma. The posterior layer fre-

quently shows large pigmentary lacunae.

Pseudocoloboma is due to degeneration of the posterior layer in the course of a uveitis, where indirect illumination gives the appearance of a coloboma. The anterior layer may be entirely preserved.

C. L.

C. Monauni. Histology of the Senile Eye. Archivio di Ottalmologia, v. 26, 1920, p. 263.

This rather extensive and careful piece of work is an attempt to apply modern histochemical methods to the changes of the senile eye. Using a large number of eyes of persons showing signs of generalized arteriosclerosis during life, with a number of eyes of new-born infants and young persons for comparison, the author has employed the various stains for fat, and the fractional extraction method of Fraenkel, by which various fat solvents are used successively, sections being stained by Sudan III after each extraction.

In general the changes found fit into the complex which De Lieto Vollaro called cholesterinic steatosis of the senile eye. The principal types of change were fatty and calcareous degeneration, diminution of the elastic elements, and increase in hyalin substance. The way in which these changes affect the different tissues of the globe is described in detail.

Arcus senilis, for example, is, according to the author, to be considered as due not only to the deposit of fat and calcium in the tissues, but also to a degeneration of Bowman's and Descemet's membranes at their peripheries, with the deposit of hyalin bodies.

In the vascular tunic, the most important finding was the degeneration of the membrana vitrea, which was swollen, and gave off projections of hyalin character which have been described by others as "hyalin bodies" independent of this membrane.

An extreme degree of fatty change was observed in the ciliary muscle and the epithelium of the ciliary processes, which may have some effect in presbyopia and in the nutrition of the senile lens.

In the lens, an appreciable amount of fat was found only in lenses showing

gerontoxon lentis, more in those with incipient cataract. A marked fatty degeneration was found to affect the fibres of the zonula, which might explain the frequency of luxation of the lens in senile eyes.

In the vitreous, especially in the anterior segment, fat droplets, granules of calcium salts and many kinds of crystals, including cholesterol, were numerous; and the larger fibres had undergone fatty degeneration. These facts aid in explaining simplex and synchysis scintillans in old people.

The literature is discussed and a bibliography of 94 titles is appended.

S. G.

Onishi. History of Spectacles in Asia. Nippon Gank. Zasshi. August, 1919.

The author discusses the different makes and styles of glasses in Asia; and in a noteworthy manner illustrates his paper with ancient pictures of glasses and also pictures of exhibits of glasses from ancient days to the present time. There is no doubt that glasses were imported from Europe and were an European innovation. There were two avenues of travel, by sea, and thru Singapore by means of the Portuguese or Indians; or the other thru Samarkand (about 1387-1432). And one finds in the exhibits the ear-marks of European makes of about this time. At this time the glasses were very rare and expensive, so that in Min's time one "Hiki," a cargo (?) loom (?) bolt of silk was paid for three glasses, and a horse was paid for one pair. The author says that the practical worth of glasses is now 9 pairs of glasses for a young horse or three hiki of silk cloth. The author thinks that the Franciscan monk Giovanni, the first missionary in China must have brought a pair of spectacles (1293), as shortly before this glasses made their appearance in Italy, and he was about the age (50) at which glasses are usually needed.

Glasses were apparently brought to Japan by Xavier; he was in the habit of sending the Prince of Yamaguchi many rare or worthy gifts and probably glasses were among them. About this time, too, the traders, Chinese and Portuguese, be-

gan to handle glasses as an article of trade, and probably brought them to Hiroshima. The art of grinding spectacles was learned by a certain artisan "name Hamada" from the Dutch, either in Batavia or Formosa, and the Chinese learned this art and brought it to Nagasaki about the same time.

The materials apparently came from Constantinople across Turkestan to China; and it seems that China carried on an active trade with the Turks. In Japan it appears that the optical glass had been known in very ancient times as the name crystal-maker (Tamazuburbe) shows. The art seems to have been generally forgotten about 900 A. D. Optical glass was first manufactured again about 1624 to 1643 at the suggestion and with the help of Portuguese and Chinese in Nagasaki.

KOMOTO.

Friede, R. Tuberculids of the Ocular Conjunctiva. Klin. M. f. Augenh., v. 64, January, 1920, p. 45.

Friede reports on lichen scrofulosorum, in a boy, aged 14, and a girl, aged 25, with discussion of literature. He concludes that in lichen scrofulosorum and scrofuloderma, occasionally also in chronic affections of the glands and bones without participation of the skin, and in scrofulous conjunctivitis, a formation of nodules in perfectly or almost nonirritated conjunctiva is observed. The nodules are grayish white, of the size of the head of a pin, vascular, scattered in groups, very fugitive, without necrosis. On account of their occurrence in, and similarity to, tubercloid dermatosis or chronic affections leading to them, Friede considers them as tuberculids of the conjunctiva. According to Jadassohn, the characteristics of tuberculids of the skin are: Striking benignity, inclination to dissemination and symmetry, occurrence in shifts, mostly in chronic tuberculosis, frequent absence of typical tuberculous tissue, exceptional presence of bacilli, very variable reaction to tuberculin.

C. Z.

Engelking, E. Lichen Scrofulosorum of the Conjunctiva. Klin. M. f. Augenh., v. 64, January, 1920, p. 56.

The simultaneous occurrence of lichen scrofulosorum on forehead and body of

a girl, aged 12, and the same kind of nodules in the conjunctiva, the equal course and termination, and the identity of the histologic aspects of the efflorescences of skin and conjunctiva, led Engelking to the conclusion that this affection of the eye must be termed lichen scrofulosorum. The lichen may, in the same eye, occur with phlyctenulae which in shape and course are decidedly separated from it. The phlyctenulae with their colliqueation, different size and rapid evacuation, involvement of the cornea, cannot be confounded with the indolent nodules of lichen, of striking uniform size. While lichen is undoubtedly attributable to a localization of tubercle bacilli, the pathogenesis of phlyctenulae requires further investigation.

C. Z.

Schnaudigel, O. Conjunctiva Neuroallergica. Klin. M. f. Augenh., v. 64, January, 1920, p. 70.

Schnaudigel considers the majority of the distressing eye affections as of tuberculous origin which have been termed copiopia hysterica, according to Foerster, dry or chronic catarrhs, with marked photophobia and inability to do near work. They extend over years, with very little or no objective changes, yielding to no treatment, and finally exerting a depressing influence upon the mind of the patient. The toxins circulating in the blood render the sensitive nerves of the visual organ allergic and hypersensitive.

Affections which may produce a similar complex of symptoms must be excluded, as disorders of the lacrimal passages, nose, accessory sinuses, anomalies of refraction and equilibrium of the ocular muscles.

The often striking results of specific treatment strengthen his assumption. Within the last 10 years, 36 out of 40 patients were cured and remained so. Schnaudigel commences with 0.000001 tuberculin, which at intervals of from 4 to 5 days is increased to 0.0001. On the whole, 10 injections suffice. The argument that the affection may still be hysterical, the injections acting as suggestion, is met by the fact that all other therapeutic measures failed.

C. Z.

Blanco, T. Influence of the Genital Organs Upon the Visual Apparatus. Revista, Cubana de Oft., 1920.

The professors of Valencia University (Spain) have made very complete studies of the relationship of the eyes and the genital organs especially in the female. The influence exerted on the eyes by some functional disturbances of the genital organs, is chiefly of a functional nature, and altho there must be some somatic disturbances, they are not easily proved, at least at the beginning of the ocular complications. Many times the organic disturbance is present in the nervous centers and the disturbances reflected to the eyes are only of a functional nature. But those functional anomalies may in the long run give rise to somatic alterations.

Among the ocular conditions studied from this standpoint, the *asthenopia of accommodation* is very prominent, in many cases of which the ovarian extracts have given good results. The existence of vaginal discharge and other symptoms related to it, are points of great importance in many of these cases.

There are many cases of insufficiency of the internal recti muscles (muscular asthenopia), chiefly seen in myopes, that occurred in nonmyopic subjects but in which pregnancy had a very etiologic influence, as they were cured as soon as labor was completed. This opinion is more reinforced, according to the author, by the amelioration of the cases of retinitis of pregnancy, after the death of the fetus; and before any symptoms arise of the pregnancy being ended, this points to some toxemia, and not to the mechanical compression.

Nervous asthenopia, or retinal asthenopia, so often confused with the form seen in accommodation, was very frequently seen by the author in women with chronic inflammation of the peri-uterine cellular tissue, and irregular menses. There are many more different functional ocular disturbances, as spasms

of the orbicular muscle, amblyopias, hemeralopia, and different neuralgias that undoubtedly correspond to some circulatory disturbances of genital origin, as do also some cases of scintillating scotomata.

Referring again to pregnancy, Blanco mentions the cases of Desmarres (amblyopia of a transitory nature), Nieden (hysteric lacrimation), Brown, Hutchinson (Basedow's disease), Jacobson (asthenopia and hemeralopia); and eclampsia (Chausier). All these symptoms and many more come from some disturbance of the nervous centers.

In conclusion, the symptoms mentioned are due to depression mostly of asthenia or palsies; others are due to lack of co-ordination; and still others to hyperesthesia. In some cases the aspect changes on account of the occurrence of organic disturbances. The great majority of them occur in predisposed subjects, so that their etiologies are complex, and the genital influence is only a part of the whole of many parts.

J. Bollack. Quinin Amaurosis and Retinal Arterial Tension. Ann. d'Ocul., 1920, v. 157, p. 154.

The author was able to examine the fundus 15 hours after the patient took 4 grams of quinin, and 9 hours after the beginning of bilateral blindness. He found a slight, but distinct pallor of the disc, with normal caliber of blood vessels. 24 hours later this pallor had entirely disappeared, and the patient was cured. One month later, in spite of complete functional cure, there was a paleness of both discs, altho the vessels were normal. 20 hours after the ingestion of the quinin, the retinal arterial tension R. was 55.9, L. 45.9. The next day it was R. 35.95, L. 35.85. On the fifth day it was R. 30.65, L. 30.60, at which point it was maintained for one month. This retinal arterial hypotension was probably due to a vasoconstriction of the small arterioles, which manifested itself by the pallor of the disc.

C. L.

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A NEGLECTED OPPORTUNITY.

Most teachers and text-books of ophthalmology give considerable attention to the differential diagnosis of acute glaucoma and iritis; the symptoms being arrayed in parallel columns followed by an eloquent portrayal of the results of a mistake in the diagnosis. On the other hand the danger of mistaking chronic glaucoma for cataract is generally treated either not at all or in a very step-motherly fashion.

In the experience of the writer, chronic noninflammatory glaucoma is from six to eight times as common as the acute form, and the danger of mistaking it for cataract is correspondingly great; and while the results of such a mistake are not as dramatically tragic as those of taking an acute glaucoma for iritis, they are, in many cases, no less unfortunate in the end.

The subjective symptoms of beginning cataract and chronic glaucoma are so much alike, that when the physician looks at the lens with an oblique light and sees the faint gray or greenish re-

flex from a slight nuclear sclerosis, which is so common, he naturally concludes that the patient has beginning cataracts and tells him to wait until the sight is nearly gone before having any operation.

Altho the error is chiefly confined to the layman or the family physician; it occasionally happens that a patient with chronic glaucoma, complicated with incipient cataract, gets by the more or less trained oculist. In fact when the lens opacities prevent a clear view of the fundus; with vision not markedly less than the cataract would account for and with a tension not much above normal, such a mistake is by no means inexcusable.

Teachers of ophthalmology should pound into the minds of students and nonophthalmic physicians the danger of mistaking chronic glaucoma for cataract. Ophthalmic practitioners should constantly bear in mind the possibility of glaucoma lurking under cover of a beginning cataract, and by attention to the tension, the fields and

what can be made out of the fundus thru the dilated pupil, should try to avoid overlooking the complication.

The use of a drop of homatropin solution in such cases is justifiable and not dangerous if followed within fifteen minutes by a liberal dose of eserine, to be repeated often until the pupil is small and stays so.

H. G.

TESTS FOR POOR VISION.

Much needs to be done in the way of standardizing our common tests for visual acuity. It is ludicrous to attempt to determine and record vision accurately; with letters that differ fifty per cent in the distance at which they can be recognized. But the height of absurdity and loose practice regarding scientific data is reached when we come to deal with eyes having poor vision.

To determine the visual acuity of such eyes we rely usually on the recognition of the larger letters on our test cards. The largest is commonly one supposed to be recognizable at 60 metres, then two of half that size, and three others that indicate at 6 metres a visual acuity of one-third standard, or less. Occasionally a card has been printed with a letter two or three times larger than the above, but such departure from custom is at once recognized as cumbersome without any corresponding advantage, and is generally put aside.

The top letter on the test card may be B, just fairly visible at the distance indicated, or L that can be recognized almost twice as far by any eye with "standard vision." It is bad enough when we have five to ten block letters of one size on each line, so that differences of visibility may be somewhat balanced; or when some of the letters that are hardest to see are included, making the test nearly an accurate one.

When, however, there are just one or two letters of a size two fatal obstacles to accurate measurement of visual acuity arise; the letters are very quickly learned, and the result of the test depends on the particular letter or letters that happen to be on that card.

When the patient knows the letter from memory, it is quite impossible for him to be sure whether or not he can just recognize it by sight. This is true of the most exact and conscientious observer; and becomes a real and important cause of inaccuracy with those numerous patients whose eagerness for improvement in vision, or desire to prove that they are getting worse, overcomes their feeble disposition to exactness in their observations. A test card having its single letter once recognized, becomes useless for testing that patient; and a few attempts to find out a patient's actual visual acuity will quickly use up one's whole collection of test cards; apart from the inaccuracies that depend on the differences of visibility of the different letters.

Accurate testing of vision, and particularly the exact testing of poor vision, requires the use of an unlearnable, definite test figure. Snellen proposed the first of these in 1873, what the Germans call his "haken" or hooks; but which are frequently mentioned by writers in English as the "Snellen E." In 1889, Landolt proposed the "Broken ring test," a figure also having those advantages, and in 1890, the writer brought forward a similar test, the incomplete square. Since then Wolffberg's "cross-point" test, and Ewings "broken line" test, all capable of being used in the same way, have been devised. See v. 3, pp. 9 to 21, A. J. O., Jan., 1920.

Snellen made the mistake of having his test arranged in lines like the letters on a test card; and when the broken ring was chosen as an international test, Hess and his committee fell into the same error. Landolt did suggest that one could have a single broken ring printed on a small card, to carry in the pocket and use at the bedside. But it was only after carrying and using the "incomplete square" in this way for 15 years, that it dawned on the writer that the effective use of any such test depended on having it printed in a small symmetric group; so that it could be turned in any direction, and could thus be made a strictly unlearnable test.

The method of using such a test must

be slightly different from that of using the card of test letters. Taking a card with the figure of appropriate size, the patient is shown the card from a short distance where he can easily recognize the figure, and he is told what is expected of him. The figure is turned first one way and then another, or the different ones on the card are pointed out; and he is required to indicate, by word or pointing, whether the figure is turned up or down, or to the right or left. When one is sure the patient knows what he is expected to do in the test, the card is carried to a greater and greater distance, or a card with smaller figures is used, until the limit of distance is ascertained at which the direction is correctly indicated in three out of four tests. This distance as the numerator, with the distance at which the figure could be recognized by standard vision as the denominator, gives the fraction expressing visual acuity.

In making the test in this way, a variable distance has to be employed; just as we use a variable distance when the vision is so poor that the largest letter cannot be seen at 6 meters, or when we take the vision as "counting fingers" at the variable distance. It is much more accurate than counting fingers because the card background for the figure is constant, and it is easy to make the test with a practically constant illumination. This is possible even in the sick room, by use of a pocket flash light; and the card required is easily carried in the pocket, quite in contrast with any cards that carry large test letters. Of course with decidedly poor vision, conditions of accommodation, or convergence for distance, have no appreciable influence on the results of the test.

With such a test the visual acuity can be tested every day, and the test repeated as many times as is desirable, with scientific accuracy. Even tho vision be only "counting fingers" at a few inches; the record can be made in the usual brief form $V=0.01$. Where the changes of vision are to be followed in advancing cataract, corneal inflammation, vitreous opacities or hemorrhage, etc., such a test of visual acuity

is a source of great satisfaction. Its general use would add much to the scientific value of case reports of any of these conditions.

Probably this method of testing poor vision has not come into general use because the test cards suited for it have not been generally available. Opticians who print cards of test type do not often show much interest in a card that cannot be hung on a wall, where the name of its publisher can always be kept before oculist and patient. To remove the obstacle, of lack of an appropriate card, the *AMERICAN JOURNAL OF OPHTHALMOLOGY* will give each of its subscribers the opportunity to obtain these cards in the next few weeks; and we are confident no such simple addition to his office equipment will be more generally useful.

E. J.

MOVING PICTURE OPHTHALMIA,

In the *Journal of the A. M. A.* of September 18, in the Paris letter, there appears the description of a special variety of conjunctivitis found very frequently in actors who are employed in making moving pictures. From the description of the symptoms present, the condition would seem to be one of photophthalmia, the cause being long continued exposure to the glare of the battery of arc lights with which the studios are lighted for the taking of pictures.

A priori, the existence of such a condition should not excite surprise. The real cause for surprise is absence of previous observations, in as much as the business is about two decades old, altho the methods of interior photographing is of more recent date. Considering the large number of actors employed in Los Angeles and its vicinity, it is certainly surprising that no mention has been made of this condition by our colleagues of that city.

It would be interesting to learn if it does not exist, or if it is so common that it is not considered worthy of being reported. The treatment suggested is the wearing of protective glasses

during the preliminary work, leaving them off only when the permanent pictures are being taken; together with the use of collyria after the disease has appeared. Is it not possible that this could be replaced by a form of lighting which is noninjurious and commercially practicable?

C. L.

BOOK NOTICES.

Edridge-Green, F. W., M. D., F. R. C. S. *The Physiology of Vision with Special Reference to Color Blindness.* 292 pages, 20 illustrations. London, G. Bell and Sons, Ltd.

For twenty years Edridge-Green has been publishing his observations and theories regarding color blindness; as these gradually accumulated and developed from his work in this department of physiology. This volume sets forth what he considers the most significant facts of the subject, and his theory of form and color vision as now held; with discussion of the inadequacy of the earlier explanations of vision and color.

For many years the voice of Edridge-Green was as the voice of one crying in the wilderness. But slowly he has won the attention and support of some physicists, physiologists and ophthalmologists; until now his theory of vision commands at least equal attention with the older explanations of phenomena of color vision known by the names of Young, Helmholtz and Hering. The older views are adequately stated in our standard text books. This presentation of their younger rival in rather brief condensed form is most welcome.

The book is in no way a reprint or a rehash of its author's published papers; but a compact, simple, comprehensive account of form and color vision from its author's standpoint. "Each section of the subject has been given from the point of view of new facts apart from any theory, and so is available for an explanation on any theory."

It is divided into 30 short chapters, the headings of which give such a full

synopsis of the subject, as well as an excellent idea of the work, that we quote the list in full as follows: The Excitation of the Visual Apparatus; Special Points in the Anatomy of the Retina; The Dioptries of the Eye; The Accommodation of the Eye; The Physiology of the Iris; Defects of the Eye as an Optical Instrument; The Action of Light on the Retina; The Origin of Visual Impulses; Light and Dark Adaptation; Visual Acuity; Positive and Negative After-Images; The Time Relations of Visual Sensation; Variations in Light Sensation; Various Visual Phenomena; Binocular Vision; Summary; The Sensations Caused by Simple and Mixed Lights; The Simple Character of the Yellow Sensation; Methods of Examination of the Color Sense; Hexachromatic Vision; Color Blindness; The Evolution of the Color Sense; Trichromatic Vision and Anomalous Trichromatism; The Positive Effect of Stimulation of the Retina on Surrounding Regions; Simultaneous Color Contrast; Successive Contrast; Color Adaptation; The Theory of Color Vision; and, Objections to other Theories of Vision and Color Vision.

There are many allusions to the various tests for color sense, and the results attained by them, which comments are generally favorable to the tests of the author, and quite the reverse to the older wool tests.

E. J.

Practical Materia Medica and Prescription Writing. Edited by **Oscar W. Bethea, M. D., Ph. G., F. C. S.,** 562 pages. Philadelphia, F. A. Davis Co. Price, \$4.50.

To one whose armamentarium of materia medica has resolved itself to the administration of but a few potent and well tried remedies, the reading of even an expurgated, modern book of *Materia Medica*, such as this is, brings back to the mind the old days of poly-formulae; but, at that, the number of drugs treated herein is comparatively restricted and prescription writing materially simplified.

Pity it is that the majority of the profession yet hangs to the old apothecary

system, and hence it is necessary in a book of this description to give both the new signs and symbols and their equivalents in the metric system, the latter the only one, especially for those who mainly prescribe solutions and active ingredients.

The best part of this book is the last half, in which its editor takes up the subject of the metric system and medical Latin, abbreviations, history writing, prescriptions, signatures, labels, written instructions, and then gives many samples of proper and improper prescriptions. The clinical index and general index are full of help in reference. The book is well printed and bound.

H. V. W.

American Medical Biographies. Howard A. Kelly, M. D., Ltd., F. A. C. S., and Walter L. Burrage, A. M., M. D. Large 8 vo. double column, 1,340 pages. Baltimore, The Norman Remington Co. Price, \$15.

There are certain lines on which the special practitioner should keep in touch with the general profession of medicine to which he belongs; and one of these is the history and biography of that profession. The American physician, drawing so much of medical science and art from the schools and literature of Europe, is apt to underestimate the greatness of the American physicians and surgeons of the last three hundred years; with the possible exception of a few of his own teachers, or those identified with his particular locality or department of medicine.

Of the 1948 biographies included in this volume, 80 are of those who have done important work in ophthalmology. Ophthalmologists have written most of these biographies; but their contribu-

tions to this work are not confined to sketches of their predecessors in this special field. More than 150 sketches have been written by well known ophthalmologists. Among these, James A. Spalding takes the lead with 54. Next comes Thomas Hall Shastid, 38; then the late Leartus Connor, 29; Harry Friedenwald, 18; Lewis H. Taylor, 3, and 11 others to be credited with one each. It is of interest to know that our colleagues, in addition to their full lives of scientific work and daily ophthalmic practice, have found time to make such contributions to the history of our profession.

This book is a successor to Kelly's "Cyclopedia of American Medical Biography" containing almost sixty-five per cent more separate sketches. It deals only with those dead at the end of 1918, in conformity with the principle that "no man is fit subject for biography till he is dead." The sketches are terse, condensed statements of the leading facts of the subject's life, without "platitudinous remarks on the excellencies of the subject," or unimportant details regarding his personal tastes or appearance. In the absence of any book devoted to the biography of those who have preceded us in ophthalmology this work is an excellent place to find out about those who were really prominent in their day either in their professional work, or in some other field of general science or in literature. "Even a cursory glance at this long list of the illustrious dead ought to inspire us who are left to pass along the torch to greater zeal in our daily task." Either for information or for relaxation this volume will furnish good reading.

E. J.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities.

DEATHS.

Dr. Wilbur Daniel Cook, Chicago, aged fifty-seven, died August 23rd, from cerebral hemorrhage.

Dr. S. Eperon, Professor of Ophthalmology at Lausanne, is dead.

Dr. John Johnson Kyle, Los Angeles, aged fifty-one, died August 29th, from pneumonia.

Dr. William C. Lewin, Buffalo, New York, aged fifty-seven, died August 1st.

Dr. J. P. Nuel, of Liège, died August 21st, at the age of 73.

Dr. U. Vetsch, director of the Ophthalmic Service at St. Gallen, Switzerland, is dead.

PERSONAL.

Dr. Arnold Lawson has had conferred upon him the distinguished order of Knight Commander of the Order of the British Empire.

Mr. J. Burdon-Cooper has been appointed lecturer in physiologic optics to the Department of Ophthalmology in the University of Oxford.

Dr. H. D. Fallows, New Hampton, Iowa, has been placed in charge of the Eye, Ear, Nose and Throat Department of the Park Hospital Clinic, Mason City, Iowa.

Dr. George F. Suker, Chicago, has been appointed Major by the War Department, as emergency officer in the Medical Corps of the Regular Army.

The Albert Medal of the Royal Society of Arts for 1920 has been awarded to Albert Abraham Michelson, Professor of Physics in the University of Chicago, whose optical inventions have ensured minute precision in measurements.

SOCIETIES.

Dr. Harry A. Smith of Delta, Colorado, was elected president of the Colorado State Medical Society at the annual meeting held recently at Glenwood Springs. Of the last five Presidents elected by this Society four have been ophthalmologists.

The first fall meeting of the Kansas City Eye, Ear, Nose and Throat Club was held on September 6th. Papers were presented by Dr. J. H. Thompson, Dr. Hugh Miller and Dr. H. E. Thomason. Reports were made of the perfected plans for the entertainment of the meeting of the American Academy of Ophthalmology in October.

MISCELLANEOUS.

The General Medical Council of England has been urged to initiate the following reforms:

1. That each candidate for a license to practice be compelled to attend an ophthalmological clinic for three months.

2. That the final examination shall include a clinical examination by ophthalmic surgeons.

The Blind Persons Act, of the United Kingdom, entitles blind persons to obtain, at the age of 50, a pension to which they would normally be eligible at the age of 70, went into operation September 11, 1920. The Act is intended to apply to those who are so blind as to be unable to perform any work for which eyesight is essential. They must be natural-born British subjects who have resided in the United Kingdom since reaching the age of 30, for an aggregate period of not less than 12 years, and whose circumstances would render them eligible for old-age pensions if they were now 70 instead of 50 years of age. In the event of an appeal against the decision of the local pension committees, as to whether a claimant fulfils the statutory condition of blindness, the Ministry may refer the case to a medical man for investigation. —*Lancet*, September 11, 1920, p. 517.

Industrial Blindness—The returns of the civilian after-care department, of the National Institute of the Blind in England, show Lancashire to have 4,202 sightless persons as compared with 2,593 in Yorkshire. This difference is largely due to the character of the industries carried on in the two counties. Mining and steel industries are both highly dangerous occupations, especially with regard to the eyes of the workers. In spite of the attention given by the local authorities to the prevention of such injuries, it appears that the number of those who have lost their sight from industrial causes has increased during the last ten years. On the other hand, the compulsory notification of ophthalmia neonatorum has resulted in a great diminution of infantile blindness.—*Lancet*, September 11, 1920, p. 581.

A movement has been started in Belgium to raise a monument to the memory of Michel Brisseau, at Tournai, where he was born in 1676; and a French committee has also been formed to invite subscriptions towards the desired object, and to help in every way the

work of their Belgian colleagues. Brisseau was the first to demonstrate the seat of the opacity in cataract. As readers know, he performed depression upon the eye of a dead soldier affected during life with cataract, and then opening the eye found that the opacity he had depressed into the vitreous was in fact the crystalline lens.

When he placed his observation and conclusions before the French Academy in 1715, he was confuted by Galen's views as to the nature of cataract. The Academy refused to recognize the doctrine until three years later, when Brisseau brought forward new evidence as to the truth of his view. Brisseau thus prepared the way for Jacques Daviel (1745) to devise the operation for cataract by extraction of the crystalline lens. The question has been often raised whether Michel Brisseau was a Frenchman or a Belgian. The controversy may now be regarded as closed by a recent article (*Arch. d'Ophtal.*, July, 1920), in which Professor van Duyse shows that Jacques, the father of Michel, was born at Paris, while Michel was born at Tournai at a time when that city belonged to France (1667 to 1709). It is of more consequence to note that the Belgian and the French Ophthalmological Societies have now united in honouring the memory of Brisseau.—*British Journal of Ophthalmology*, v. 4, p. 421.

Eyesight of Soldiers—The anxiety of the Germans about the good shooting of their army, their determination that all soldiers

should have their errors of refraction corrected by "shooting spectacles," and that breakages, if they occurred, should be immediately replaced, are well brought out by Major R. A. Fenton in the *Military Surgeon* (Washington, D. C., U. S. A.) for July. An "optical chest," holding 208 pairs of lenses and 84 empty spectacle frames, was carried by every division and even up into the front line. Men with uncommon defects had a duplicate pair of lenses supplied them before leaving Germany (the prescription was pasted into their pay books; and the medical officers of their units were responsible that these spare glasses were on the men or replaced). German ametropes wore special spectacles inside their gas masks, but Americans wore theirs outside. The German lenses were 38.2 mm. in diameter, the American 40 mm., which made a little awkwardness when the United States Army captured German stores and wanted to use the spare lenses found, in their own spectacle frames. The lenses were very often menisci to diminish distortion in the periphery of the field. The loss of useful service of soldiers whose spectacles were broken was considered at headquarters to be so important that replacements in the optical chest were demanded immediately by post, and by post issued from headquarters in Germany directly. We have little doubt that our army had no such detailed arrangements for helping ametropes.—*Lancet*, September 11, 1920, p. 582.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colo.

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- Grafe, E.** Source of Error in Examination of Dark and Light Adaptation. *Münch. med. Woch.*, v. 67, 1920, p. 634. *Abst.* *Jour. A. M. A.*, v. 75, 1920, p. 904.
- Hensen, H.** Etiology and Diagnosis of Bilateral Blindness. *Münch. med. Woch.*, v. 67, 1920, p. 601.
- Montaño, E. F.** Endophthalmometer. *Anales de la Soc. Mexicana Oftal. y Otol-Rino-Laringol.*, March-June, 1920, p. 56.
- Rehm, O.** Visual Field Examinations in Maniacs. *Zeit. f. d. Neurol. u. Psychiat.*, v. 55, p. 154.
- Roubinovitch, J.** Manometer Compressor for Eyeball to Induce Oculo-cardiac Reflex. *Encephale*, v. 15, 1920, p. 902.

THERAPEUTICS.

- Cheinissee, L.** Application of Tincture of Iodin to Eye. *Presse Méd.*, v. 28, 1920, p. 486.
- Ganguli, P.** Flavin in Ophthalmology. *Indian Med. Gaz.*, v. 55, 1920, p. 258.
- Kleefeld, G.** Sulfarsenol in Ocular Therapeutics. *Ann. d'Ocul.*, v. 157, 1920, pp. 428-432.
- Lancaster, W. B., Burnett, F. L., and Gaus, L. H.** Mercurochrome—220 in Ophthalmology. (Dis.) *Jour. A. M. A.*, v. 75, 1920, pp. 721-725.
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- Terrotoli, G.** Milk Injections in Ocular Therapeutics. *Il Policlin.*, v. 27, 1920, p. 870.
- Velez, D. M., and Gonzalez, J. de J.** Action of Tuberculin on Normal and Pathologic Eyes. *Anales de la Soc. Mex. Oftal. y Otol-Rino-Laringol.*, March-June, 1920, p. 52.

OPERATIONS.

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- Velez, D. M.** Surgical Anatomy Applied to Ocular Surgery. *Anales de la Soc. Mex. Oftal. y Otol-Rino-Laringol.*, March-June, 1920, p. 56.

REFRACTION.

- Bollack.** Paralysis of Accommodation with Encephalitis Lethargica. *Soc. d'Opht. de Paris, June, 1920.* *Abst. Ann. d'Ocul.*, v. 157, p. 446.

Eperon. Removal of Lens in High Myopia. *Schweiz. Rund. f. Med.*, 1920, v. 20, pp. 257-262.

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Lea, J. A. Paresis of Accommodation following Injury by Lightning. *Brit. Jour. Ophth.*, v. 4, 1920, p. 417.

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Wood, D. J. Accommodative Failure in Malaria and Influenza. *Brit. Jour. Ophth.*, v. 4, p. 415.

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- Eisner, E. Erythema Exudativa Multiforme with Scleral Involvement. Derma. Cent., v. 23, 1920, p. 98.
- Fuchs, E. Affections of Sclera. Arch. de Oft. Hisp.-Amer., v. 20, 1920, p. 270.
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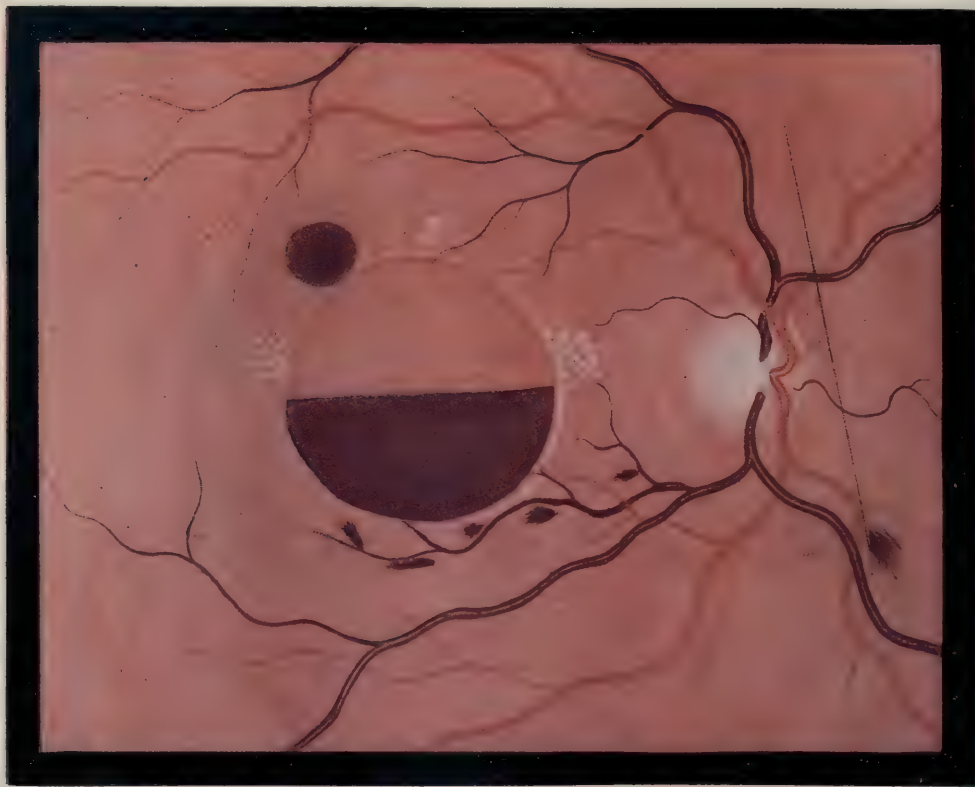
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254



THROMBOSIS OF RETINAL VEIN WITH HEMORRHAGE, FOLLOWING INFLUENZA (JACKSON)

THROMBOSIS OF RETINAL VEINS AFTER INFLUENZA.

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Two cases are here reported with citations from the literature confirming the connection between influenza and thrombosis. Read before the American Ophthalmological Society, June 16, 1920.

The clinical course and exact pathologic changes of obstruction of the retinal vessels are still so imperfectly known, that we are justified in recording additional cases that seem to be of this character.

CASE 1. Mrs. H. J. M., aged 59. History negative, except an attack of influenza, in May, 1918, from which she lost over 20 pounds in weight. Two of her children, both young adults, subsequently died of this disease. Having suffered severe pain in the head and eye the day before, the sight in the right eye became very dim on June 20. She was given potassium iodid in moderate doses which made her very sick at stomach; and she was kept in bed for several days. Later she was given this drug up to 5 grains three times a day; but it could not be continued, and 2 or 3 grains a day was all that was well tolerated.

1918. 7:22. First seen by the writer with vision R. = .006 excentric. L. 0.5, without glasses. She thought the sight of the right had grown a little better in the last day or two. General health good, blood pressure 140-120. Urine normal. External appearance of eyes normal. Media clear. The arteries seem rather pale with broad light streak. The veins are a little irregular in caliber and slightly obscured at some crossings, especially in the macular region of the right eye. In this region there is a large hemorrhage two and a half disc diameters in diameter. This has a nearly circular smooth outline; and the upper more than half has been absorbed. Its original border is shown by a light grayish line apparently not a reflex. A second hemorrhage, much smaller, is situated near

the upper temporal margin of the first. Both are apparently subhyaloid in situation. A still smaller hemorrhage is seen along the lower nasal branch of the retinal artery. The lower macular vein is large, tortuous and obscured as it approaches the macular hemorrhage. Several other small hemorrhages are found in its distribution.

7:26. The above appearances are shown in the sketch made today. (See accompanying color plate, Case 1.) The absorption has progressed since the eye was first examined. There are also white spots in the retina near the lateral borders of the large hemorrhage.

7:31. Vision had increased in R. to 0.8.

8:5. Vision R. = 0.67.

1919. 1:11. Corrected vision is now: R. +1 \ominus -0.50 cyl. Ax. 75° = 1.

L. +1.50 \ominus -1. cyl. Ax. 95° = 1.2.

The area originally covered by the larger hemorrhage now presents about 50 white dots scattered thruout its extent, each looking much like those shown, outside this area on plate, which have not entirely disappeared. The appearance of these dots resembles Plate XXXIX, Fig. 89, in Frost's Atlas¹; except that in this case the dots are seen, not against a dark area of hemorrhage, but against almost normal fundus. Except for these, and the slight vascular changes noted at the first examination, the fundus of the right eye appears normal.

CASE 2. Mrs. G. B. G., then aged 33, was seen for headache and eye ache in 1918. 5:9, and given the following:

R. -0.75 cyl. ax. 88° V. = 1.2.

L. -1.37 cyl. ax. 88° V. = 1.2.

The ocular fundus was normal in each eye, except that the retinal veins were slightly obscured at some of the crossings. The glasses relieved the headaches. Her history was otherwise negative.

1918. 12:2. About October 10th she had influenza, was in bed five days, then had general headache four days. After this she noticed blurred vision. She remained weak for about two weeks after the attack. Vision is now R. 1.2, L. 0.3. There seem to be "streaks of cloud" just below the point looked at. There

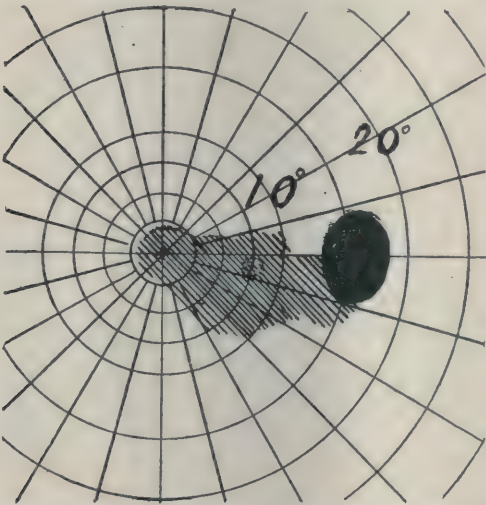


Fig. 3.—Chart of field of vision Case. 2. Relative scotoma shown by lines includes fixation point and extends to normal blind spot.

has been no change in this since the appearance was first noted. She is feeling very well now; blood pressure 155 systolic, 120 diastolic.

EXAMINATION. The eyes externally appear normal. The media are clear. R. Ocular fundus normal. L. An area of moderate haziness, swelling, and striation of the retina extends from above the disc to include the fovea. (Shown in the color plate. Case 2.) This area is rather sharply limited in most directions. In it are seen numerous flame-shaped hemorrhages, some white spots, and tortuous dilated veins. (At this time the upper temporal vessel which was obstructed was so hidden at the disc, that it might be taken for either an artery or vein, but later was found to be a vein.) The fovea shows as a darker

red spot. The scotoma found to correspond to this area is relative. (Fig. 3.) A 6 mm. square of white against a black screen, is seen at one-half meter; except in the blind spot (which is a little enlarged), and at points corresponding to the larger hemorrhages and white spots. No change in the ocular refraction. She was given potassium iodid and told to rest the eyes.

12:19. Vision L. 0.15. There is less haziness of the retina, except around the fovea, which is about as shown in the sketch. No fresh hemorrhages are seen, but some previously seen look larger and their edges appear more distinct. Others are certainly smaller, and some of the small ones have disappeared. The white spots are larger and more definite.

1919. 1:30. The hemorrhages are all much smaller. There is still edema in the macula. The boundary of the affected area is elsewhere indefinite, or wholly gone. L. V. = 0.3.

2:28. Hemorrhages all gone. V. = 0.5.

4:18. L. V. = 0.8.

5:28. The fundus appears normal, except a few fine newformed, tortuous vessels are seen in the patch of hazy exudate, near the upper temporal margin of the disc. V. = 0.8. The slight obscuration and narrowing of some veins at crossings is no longer noticed.

10:8. All newformed vessels are gone. The upper temporal vein appears quite regular and normal. The fundus to the upper temporal side of the disc is possibly a little pale and gray. Elsewhere it is normal. L. V. = 1.

1920. 3:19. L. corrected V. = 1.1 with some hesitation. She cannot see the whole of the letter. The fundus looks entirely normal in both eyes.

COMMENT. It may be questioned if Case 1 is an instance of thrombosis of a retinal vein. The hemorrhages were relatively few, and they were not confined to a single branch. Still they were multiple in the macular region, and one vein going into the lower part of the region was markedly enlarged, tortuous and irregular. On the other hand the hemorrhage in the lower nasal quadrant was close to an artery, and there was no other evidence of disease in that region.

In case 2, the evidence of venous thrombosis is more convincing. A single venous area was affected, the vessels elsewhere remained unaffected, and in this area became normal subsequently. The patient became and continues healthy. There was a distinct area of retinal edema. There was evidently a serious lesion of the venous trunk in question.

In both cases there were slight indications of increased blood pressure in the retinal vessels, but not more than we often find in patients near or after middle life, in good general health, who go for years without retinal hemorrhage or impairment of vision. In case 2 these are no longer noticed. The completeness of the recovery of vision, and also of the general condition of the fundus as discernible with the ophthalmoscope seem to indicate that the cause was neither permanent nor progressive. The blood pressure taken at different times was scarcely abnormal for the patient's age.

In its general tendency to cause thrombosis of large peripheral vessels, influenza is ranked (Blumer²) close after typhoid and the puerperal state. I have seen severe orbital thrombosis in a case of fatal influenza, and other cases have been reported. In his classic paper on Thrombosis of the Central Vein of the Retina, Coats³ says, "The patients are usually apparently in their ordinary health. I have, however, in 3 cases obtained a history of influenza, a disease which is known sometimes to cause thrombosis in the cerebral vessels. In two of them dimness of vision occurred during convalescence, and in one about a month after an attack." It is not clear whether this history of influenza was obtained in 3 of the 4 cases in which Coats made the pathologic examination of the eye; or in a larger number of cases that did not come to such examination. However, Coats⁴ reported still another case. "Thrombosis of the left central vein in a man aged 31. Onset probably during an attack of influenza a fortnight before."

Under the heading "Retinal Phlebitis," E. S. Thomson⁵ reported 2 cases in many respects similar to those here reported.

A man of about 50 years had influenza and one month later his sight became hazy. Seven months later he had another attack of influenza and a recurrence of the retinal condition. In this attack the lesion occupied an area 6 or 8 times as large as the optic disc. The other patient was a man of 39 whose eye became blurred 2 or 3 weeks after recovery from an attack of influenza. The affected region lay below the optic disc. In both these cases medical examination seemed to exclude an arteriosclerosis.

Leyden and Gutmann,⁶ among 186 cases of influenza presenting ocular lesions classified 3.2 per cent as retinal lesions, and 2.7 per cent as glaucoma. Among the latter it is probable that a large proportion were cases in which glaucoma followed thrombosis of the central retinal vein. Of 253 cases of optic neuritis ascribed to infectious disease, Uhthoff⁷ found 72 followed influenza. It might be well to consider if cases classed as optic neuritis or retrobulbar neuritis may not often be due to a thrombotic process in the nutrient vessels of the optic nerve.

Stieren⁸ among 221 cases of influenza found 54 presented ocular symptoms. Of four fatal cases in pregnant women, one with "marked neuroretinitis," had small flame shaped hemorrhages, another "had a fundus picture closely simulating albuminuric retinitis"; and another "an extremely cyanotic retina."

The white spots in the macular and paramacular region, which were a striking feature in both my cases, and such as are figured in Frost's Atlas,¹ have been seen in other cases of retinal venous thrombosis. In a case reported by Parsons⁹ of partial thrombosis of the central vein of the retina, they were a very striking feature. Many of them remained when the case was reported almost 3 months after the attack, altho they were then diminishing.

An interesting point is the preservation of the field of vision in these cases. This contrasts strongly with the condition found in retinal embolism, and with chorioretinitis juxtapapillaris. It is a point of considerable practical importance in the diagnosis. It is quite in harmony with the pathologic findings in the

earlier and less malignant cases of thrombosis of the retinal veins, that the obstruction to the blood current is usually not complete. Coats³ in his case 1, cut the eye in serial sections transverse to the nerve; and states explicitly, "At no point is the vein completely obliterated, nor is any laminated or organized thrombus to be found within it." In this case the retinal hemorrhages were very abundant.

Both of my patients recovered almost their full vision; and in general the prognosis of such cases seems favorable. Both patients are living and in excellent health, 18 months and two years after the retinal thrombus. This is quite the usual outcome of such cases. It is to be recognized that retinal hemorrhage from venous thrombosis due to influenza has not the sinister significance of retinal hemorrhage from some other causes.

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SELF-INFLICTED CONJUNCTIVITIS.

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Two cases here reported illustrate unusual methods of producing conjunctivitis where it would not be looked for in civil life. with an effective means of making a diagnosis and a cure.

The interesting account of cases of self inflicted conjunctivitis observed in the Belgian army by Danis, published in the August number of this JOURNAL leads me to report two cases seen in civil life.

Injuries and inflammations of the eye, self induced, have been described frequently. In degree they have varied from the mildest conjunctivitis to complete destruction of the eye;—the injury has been produced by rubbing the conjunctiva and the cornea with the fingers or with clothes and other objects,—by the introduction of foreign bodies, by injury with sharp instruments, by leech bites, etc. An interesting survey of the subject was given by Herford of Wiesbaden in 1904.¹

The difficulty in dealing with these cases lies chiefly in the diagnosis. This is well shown in the cases to be described.

J. D. H., aged 15, was brought to me from North Carolina on January 6, 1911. He had begun to complain about the first

of the past November of inflammation of the eye and had been under constant treatment since then. His physician who referred him to me wrote: "I have treated him since early in November and have used at various times cupri sulphat, zinc, silver, argyrol, zinc sulphat, boracic acid and bichlorid salve."

In spite of this, the eyes had gradually gotten worse. On examination, the lids were found markedly congested, as was also the conjunctiva. The conjunctiva was swollen and thickened. There was a free lacrimal discharge. I was soon convinced that the trouble was mechanical and probably caused by irritation by rubbing with the fingers. I therefore applied no treatment but had eyes protected by Buller shields and washed them twice daily with boracic acid. The effect was immediate and pronounced. Complete recovery rapidly took place and there has been no recurrence during four and a half years of observation.

The refraction was tested under a

mydriatic and a high degree of hyperopia was found, but his vision altho examined a number of times was subnormal and could not be brought beyond 16/30. Glasses +3.50 D.s. were prescribed in October, 1911. It was seen, however, that there was a marked loss of accommodation and tho tested a number of different times, he was never able to read without additional spherical correction. Bifocal lenses were therefore prescribed. When last seen, June 4, 1915, his vision was R. E. +3.75=20/19. L. E. +4.0=20/19. With addition of +2.0 he was able to read 0.5 D. at 13 inches. He has been wearing these glasses for some time with perfect comfort and has been able to carry on his work as a college student without difficulty.

In this case there was no evidence of hysteria or of an effort to exaggerate the symptoms. My impression was that the boy had gotten into the habit of rubbing the eyes thru an attack of mild conjunctivitis; and that a vicious circle was established which was only broken when the eyes were hermetically sealed. No explanation could be found for the paresis of accommodation nor is it known when this began. If it was present before the attack of inflammation of the eyes, then it is not improbable that the effort of near vision, in spite of a fair correction for the distance, was a factor in the production of the irritation which led to the rubbing.

Miss M., aged 17, was first seen October 2, 1905, in consultation. There was hypertrophy of the conjunctiva, with granular tissue near the outer and inner side of the lower lid. She was a well-nourished girl of large build, otherwise in good health, but who had a few years previously been severely burnt over a large part of the body.

She brought me a letter from the late Dr. R. L. Randolph, in which he stated: "I have tried everything I know of and with no satisfaction. Some four or five years ago she was under my care for a superficial keratitis of both eyes. She got all right after a few weeks' treatment. Since then she has occasionally seen me for a change of glasses. The corneal trouble has left an enormous

amount of astigmatism which I have approximately corrected. Nearly a year ago she came to me with the condition which you now see in the right lower conjunctival sac.

"I have tried protargol (both ten and forty per cent) but with no success. Argylol was tried for several weeks. Mild solutions of hydrarg. biclor. and hydrarg. cyanid. were also used, and some such weak solution or collyrium she has been using all the time. Weak solutions of adrenalin and boric acid have been employed for periods of varying length; and she is now using a solution containing adrenalin, cocain (two grains) and some boric acid. The lacrimation worries her not a little and there is often considerable burning. I might add too that I have tried blue stone and also alum on the hypertropied folds in the lower sac but with apparently no benefit.

"Three months ago I advised her to see de Schweinitz who suggested roller forceps and having the nasal apparatus looked into. I operated with roller forceps and she has been for some time under a throat man who is cleaning out the right nostril. Thus far nothing has relieved her, and I trust you can suggest something which may help the cause. I have consumed almost a year in doing her no good. . . . I might add that de Schweinitz agrees with me as to the non-trachomatous character of the trouble."

My own view was that there were a number of granulations in the upper lid which were unmistakably trachomatous. Dr. Randolph subsequently excised some of the granulation tissue and examined it especially with respect to the possible factor of tuberculosis, but with negative result. She was referred to others for examination, to Dr. Weeks and in March, 1907, again to Dr. de Schweinitz, who advised correction of her high degree of astigmatism, and suggested a thoro analysis from the standpoint of physiologic chemistry and treatment according to strict dietetic lines. The patient was then placed under the observation of Dr. de Schweinitz for a short period and he "ordered a glass of moderate tint which was an approximate correction of her very high astigmatism, Right eye —4. cyl. axis 10°; L. +1.50s

—2 cyl. axis 15°. It is worthy of note that in his opinion there was "a very large neurotic element in cases like this."

When I saw Miss M. again September 30, 1907, I found the conjunctiva of the upper lid fairly normal, that of the right lower lid showed some cicatrices but no granulations. The condition of the eyes was as described above, marked congestion, great lacrimation and the complaint of much sensitiveness to light, etc., together with a peculiar greasy discharge, the nature of which I was at first unable to determine but which proved to be yellow vaseline, but which the patient denied having applied to the eye.

I was much impressed by the absence of any extension of the disease and by the disappearance of granulations, and it struck me that the condition could best be explained as the result of some continuous irritation, and this led me to suspect that the patient was herself inflicting the injury. The eye was therefore sealed under a Buller shield and no treatment but washing with boric acid was used. The secretion and congestion rapidly disappeared, and only once or twice was the vaseline discovered, the patient having had access to it while in the bath room, so that within two weeks the eye had cleared up almost like its

fellow. In discussing the subject with her physician, I then learned that about one year before she had had hysteric retention of urine which could only be relieved by catheterization.

The patient made progress until October 11, 1909, when she complained of pain and some bleeding from the eye. The Buller shield was again used but on November 25 I saw the bleeding coming from a straight red line near the cornea. She had evidently scratched the eye with a needle. It was deemed best after consultation to give up all treatment and this had the most beneficial effect for since that time there has been no recurrence of trouble.

In this case hysteria and the desire for constant handling and treatment undoubtedly caused the long standing trouble which had baffled our ablest oculists.

The cases just described were both binocular, while Danis describes the condition as always monocular. Like some of the cases of Danis our second case presented "papillary hypertrophy suggesting the granulations of trachoma."

Those who are interested in the subject will find a good account in the article by Herford,¹ and in Holden's² "Self-mutilation of the Eyes by an Ancient Saint and a Modern Sinner."

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VALUE OF DENTAL EXAMINATION IN THE TREATMENT OF OCULAR DISORDERS.

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This paper from the Section on Ophthalmology of the Mayo Clinic discusses the methods of transmission of dental infections to the eye. It also reports clinical cases in some of which the infection was studied experimentally in the Laboratory of Experimental Bacteriology of the Mayo Foundation. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology, July 24, 1920. See page 899.

The influence of dental sepsis on diseases of the eye has been investigated by many workers since Lang, in 1913, published his observation on the subject,¹ and a large number of case reports have been published which demonstrate the value of examination of the teeth in treating diseases of the eye.

Carefully observed cases of periostitis, orbital abscess, iritis, and uveitis that can be definitely ascribed to dental sepsis have been recognized and described. While the exact process of extension from the teeth to the eyes was in many instances not known, the improvement of the eye conditions that followed correc-

tion of the disease about the teeth was considered sufficient evidence that a close relationship exists. When a rather severe chronic corneal ulcer that had failed to yield to common methods of treatment healed readily after the extraction of a diseased tooth, when chronic or recurrent iridocyclitis became quiet following the removal of infected teeth or the treatment of pyorrhea, other probable causes of the disease having been eliminated, the conclusion was justified that the disease of the eye was due to disease about the teeth, or that toxins absorbed from suppurative foci about the teeth contribute to the chronicity of the ocular affection.

That pyorrhea or partly decayed teeth in the mouths of persons suffering from disorders of the eye do not more frequently appear to have an influence on the course of the disease has been used as an argument against the causal relationship of dental and ocular affections, but if we more fully understood the characteristics of the organisms that produce disease, and the changes in virulency of the organisms and variations in the strength of the resistance which nature puts up as a barrier to the spread of disease, we probably could more easily account for the few metastatic infections, and arrange a more satisfactory system of prophylaxis.

METHODS OF TRANSMISSION.

Eyes, previously healthy, may become diseased by the transmission of organisms from diseased teeth in one or more of three ways:

1. Direct extension thru bone. The tooth socket becomes the seat of an infection that destroys the bone of the upper jaw, and thru that directly affecting the orbital walls, finally producing an orbital cellulitis or retrobulbar neuritis. Such extensions of the disease process about the teeth seldom affect the interior of the eye, but are found as abscesses of the lids, particularly the lower, abscesses of the sinuses, emboli, abscesses of the frontal lobe with atrophy of the optic nerves, and periostitis.

2. Direct extension of the process along the periosteum of the malar bone invading the orbit and giving rise to processes similar to those mentioned.

3. Transfer of organisms from the

focus at the tooth to the eye by the blood stream. This is the most frequent means of transfer of infection from the teeth to the eyes, and consequently is the most important.

It is often difficult to demonstrate that infections about teeth are responsible for any individual case of eye disease. Extraction of affected teeth does not always yield beneficial results. But it should be remembered in this connection that possibly all sources of organisms responsible for the eye affection were not eradicated



Fig. 1.—Case 311972. Acute iritis from dental sepsis.

with the extraction of the teeth, that organs other than the eye have been invaded and become secondary foci for the production of the same strain of organism, or that even after extraction a septic pocket may have remained in the diseased jawbone. Recurrent iritis, keratitis, uveitis, and transient disturbances of ocular motility occur from these secondary foci after the removal of infected teeth and are to be combated by the use of autogenous vaccines.

Some forms of eye diseases that formerly were believed to be due to auto-toxemia, injury, blood disease, rheumatism, or were idiopathic, have been demonstrated to be due to the actual presence of bacteria carried to the eye from suppurative foci about the teeth or tonsils. Rosenow has shown that organisms taken from diseased teeth are capable of pro-

ducing disease of the eye when injected directly into the blood stream of animals; and furthermore, that such organisms have a selective affinity for certain structures of the eye and that within limitations this selective affinity is characteristic of the strain and is maintained thru several cultural transplants of the organism. He has demonstrated that organisms grown from the tooth of a person suffering from muscular rheumatism produce iritis in the eyes of animals as

due to periapical infection. The iris and choroid are more often attacked by organisms from apical infection altho optic neuritis, scleritis, keratitis, and conjunctivitis are reported to have been found.

ETIOLOGIC INFECTIONS.

CASE 311972. A man, aged 38, came to the Clinic because of attacks of inflammation in the right eye, every spring and fall for the past six years. The eye had been injured ten years previously but the

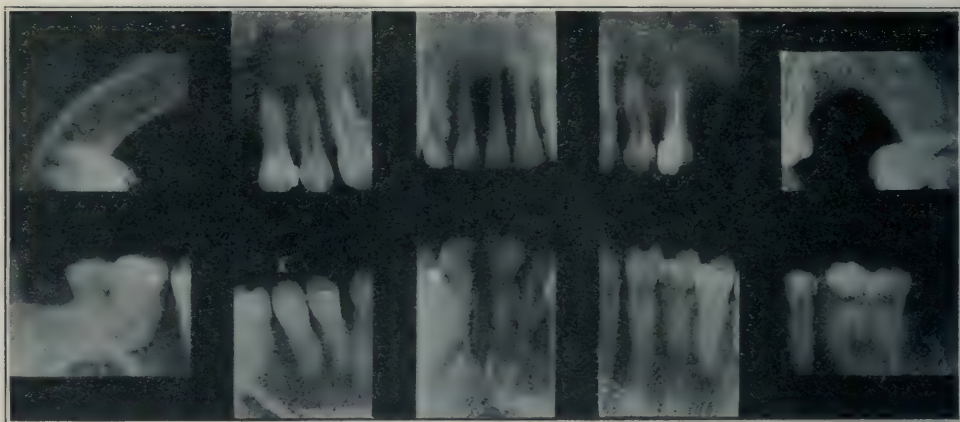


Fig. 2.—Roentgenogram showing condition of teeth in Case 311972. Culture obtained from socket of tooth marked X injected into rabbit produced iritis.

well as hemorrhages in the skeletal muscles.

The barrier that nature erects in defense of the eye may be effective against a specific strain of organism, and since organisms about the teeth multiply in kind as well as in number the fact that an eye becomes diseased in a person whose mouth has been the harbour of pus producing foci for years indicates that his barrier has been broken down, that his resistance has been lowered, or it may mean that a new organism has been introduced against which no barrier has been erected.

Attacks of eye disease produced thru dental sepsis may be of any degree of severity. Mild attacks of conjunctivitis or iritis may occur which amount to no more than a transient hyperemia of the conjunctiva, or a slightly troublesome photophobia. A rapid succession of mild attacks extending over a period of several years has been demonstrated to be

injury seemed to have no bearing on the present condition. The patient had had attacks of rheumatism for the past ten years. The attacks of inflammation of the right eye were always preceded by soreness of a right upper bicuspid which came on about three days before the eye became inflamed, and frequently had been accompanied by general rheumatic pains, particularly if he had been exposed to inclement weather. The adenoids had been removed but the tonsils had not. The patient gave no history of tonsillar infection. A general physical examination did not reveal cause for iritis, except dental infection. The tooth which he pointed out as tender preceding the attack of iritis gave practically no roentgenologic evidence of apical infection. An electric test indicated that the pulp was vital. The tooth was extracted and from the pulp Dr. Meisser secured a culture which, when injected into the blood stream of a rabbit, produced a hemor-

rhagic iritis of both eyes within a few hours (Figs. 1 to 5).

A subculture from this strain of organism injected into the blood stream of a rabbit produced a pericorneal injection within four hours; this entirely disappeared within twelve hours.

Much has been written with regard to the increased surgical risk accompanying abscess of the teeth and pyorrhea which,

dental sepsis has been overestimated, and the risk of metastatic infection following operation is not so grave as to require a person to postpone an operation, say for cataract, until imperfect teeth can be removed and the gums healed. In my own cases I have had no postoperative complications that could be traced directly to dental foci or infection.

It is now well known that inspection of the teeth alone does not reveal disease conditions about the roots. Roentgenologic examination of the entire set of teeth is required and this should be checked by tests of vitality and exploration of the gum line and contact points by means of instruments. Interpretation of findings at examination should be



Fig. 3.—Acute iritis in rabbit injected with strain of organisms from infected root canal of Case 311972.

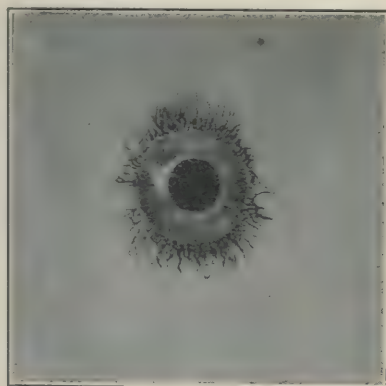


Fig. 4.—Detail of injection of iris and sclera of rabbit's eye, same as shown in Fig. 3.

I believe, is without proper foundation. It is not only unnecessary but often inadvisable to subject an elderly person to dental treatment sufficient to make the mouth surgically clean. The extraction of partly decayed teeth, snags, roots, and the vigorous treatment of retracted gums, while desirable from a general hygienic standpoint, is unwarranted as a routine procedure in general ophthalmic surgery, and often imposes hardships on persons whose strength and courage are none too great to carry them thru the anxiety associated with surgical procedures. I do not advise against the cleaning up of month infections before undertaking operations on the eye, but I do believe that the urgency of such procedures has been overstated, the danger of operating in the presence of

checked by the history of the patient's dental disturbances. The importance of this point is illustrated by Case 311972. The patient had observed the relationship between periods of tenderness of a certain tooth and recurrence of his iritis, but this particular tooth was vital, as shown by electric test, and the roentgenogram did not give conclusive evidence that there was infection about the root. Another important illustrative case history has been reported by Rosenow.² In this patient fractures of the roots of the front central incisors had been sustained eleven years previously, but by inspection alone the teeth seemed to be perfect. Cultures from these teeth injected into the blood stream produced iritis in rabbits.

REFLEX DISTURBANCES.

The greatest interest centers around the infection of teeth when investigation of the dental condition is carried out in ophthalmic cases, but there remains an equally important field in the consideration of reflex irritation for crowded, unerupted, or impacted teeth. Many instances can be gathered from the literature of reflex spasm of the lids or extraocular muscles, asthenopia, amblyopia, strabismus, and even so-called trophic disturbances believed to be due to irritation

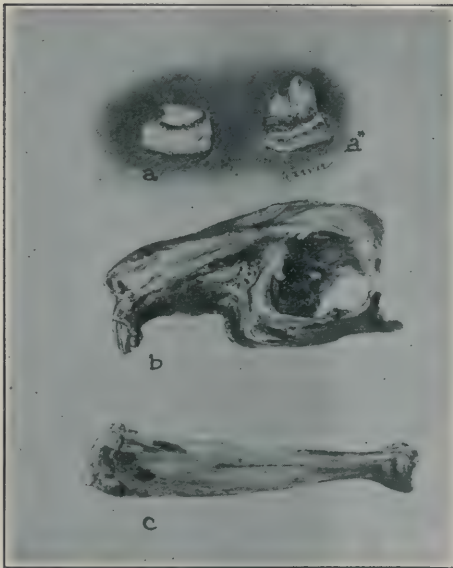


Fig. 5. a and a*. Hemorrhages at the base of iris, posterior surface. Rabbit's eye shown in Figure 3.

b. Hemorrhagic and edematous area opposite root of the upper left incisor.

c. Hemorrhagic and edematous area of the muscles of the inner and anterior aspect of the right tibia at the point of insertion.

from the teeth thru the branches of the fifth nerve. The diagnosis of reflex eye disturbances must be made largely thru exclusion. The frequency with which foci of infection are encountered, particularly around the teeth and tonsils, makes it difficult to rule out such foci as responsible for disturbances which may be considered to be of reflex origin. The affections may be only symptoms of neurosis so that at all times a ready acceptance of reflex diagnosis must be guarded against. Ocular disturbances of undoubted reflex origin, however, have been described. The following history is typical of the reflex group:

CASE 247172. A woman, aged 22, complained of periodic twitching and pulling of the right eyelids for the past three and one-half years. She had a great deal of headache of the migrain type. She had worn for several years a correction for myopic astigmatism but use of glasses did not lessen the amount of twitching. There was no photophobia at any time but a dull moderate ache of the right side of the head and face accompanied the twitching contraction of the lids of the right eye which was present at all times, giving the appearance of ptosis. To keep the eye open she augmented the action of the right levator palpebrarum by contraction of the frontalis muscle, wrinkling the right side of the forehead and arching the brow. There was no disease condition of the conjunctiva nor globe and the vision of both eyes was normal. Inasmuch as a general physical examination was reported negative, the patient was carefully refracted and not seen again for a year.

At her next visit to the Clinic she stated that the month following the former visit she had a severe spasm of the right lids accompanied by headache which lasted for one week. For seven months following she had been free from such attacks. The month preceding her second visit, however, she had suffered a similar attack which also lasted for about one week. At the time of her second visit there was no spasm of the orbicularis, and the lids opened and closed easily, altho the lids of the left eye opened more readily than those of the right.

A dental examination was made at this time and three teeth were found to have apical abscesses and four teeth were impacted. A right impacted molar was extracted. Seven weeks later the patient reported that she had not had further attacks of lid spasm and that she "felt as if a weight had been removed from the lids." Nine months later she wrote, "Since I had the impacted wisdom teeth removed my eyelid has pulled but little."

CASE 318611. A man aged 64 came to the Clinic because of diplopia, which had appeared suddenly three months before. The vision was 6/5 in the right eye and 6/7 in the left. The left external rectus was completely paralyzed. A thoro and painstaking examination

was made to determine the cause of the paralysis. Wassermann tests of the blood and of the spinal fluid were negative. A Nonne test was negative, and a neurologic examination failed to reveal any other disturbances of the nervous system. The only other cause found for the paralysis was the possible irritation from infected teeth, and since the patient had a number of fractured and decayed teeth, all in exceedingly bad condition, he was advised to have the remaining teeth and parts of teeth removed. The day following the removal of the last teeth the paralysis began to disappear and entirely disappeared within three weeks.

Since the introduction of a dental section at the Mayo Clinic, the relationship of diseased teeth and lesions of the eye has been carefully studied. Definite relationship has been established in a number of cases of acute inflammatory eye lesions and similar lesions produced in animals by means of methods described by Rosenow. Autogenous vaccines made for the patients have been used to supplement the treatment with highly gratifying results. In many conditions of the eye other than inflammation from infection the dental examinations have given valuable aid and results which are encouraging and warrant further investigation.

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SOME OPTICAL IMPERFECTIONS OF THE EYE AND SOME OF THEIR USES.

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This contribution to the literature of physiologic optics deals with the effects of light entering the eye thru the sclera. It points out the effect such unfocussed light has on visual acuity and on the perception of colors, particularly green. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology, July 24th, 1920. See page 895.

We have all been impressed with the scientific paradox uttered by the greatest master builder of the foundations of your profession when he declared, in effect, that should an instrument maker send him a camera so optically defective as the human eye, he would reject the apparatus with a stinging rebuke. Helmholtz thus in a sentence established the relation between an imperfect organ and its perfect product. Indeed, I venture to believe that the Mind, which after all is the Thing, finds important, if not its most important, material for culture in the physical and physiologic imperfections of the organ of vision. It is a matter of elementary knowledge that the anatomic camera is distinguished by the enormous field of view it gives us with the extreme limitation of the area of visual distinctness. We see clearly only the point directly looked at; all other

points thruout the breadth and depth of the outer world are perceived but indistinctly. A sharp visual impression of them can only be obtained one at a time thru movements engaging the intrinsic and extrinsic muscles of the eye. The sensory perception of these muscular movements is in itself a fund of mental information of profound importance to our being. But what I want to particularly emphasize is the fact that the vast preponderance of the visual world is, at any moment, represented in consciousness by ill defined and physically inaccurate images. It would be insolent presumption for us to assume their uselessness. Rather they should be regarded as the necessary background of visual perception thru which the distinct foveal image acquires a meaning it could not achieve alone.

Sensations from the periphery of the

retina stand to those derived from the fovea somewhat as the common sensibility, which informs us of the position and "aliveness" of our parts, is related to the touch localizing sensations of the skin.

Sensations from the periphery of the retina, with all their obscurity of quality, form and texture must, from the very preponderance of the nerve mechanisms involved, form an essential fund of visual knowledge. They may represent in this field the vast mine of impressions which we are told makes so important the content of the subconscious mind. What I want to emphasize is that the common defects of the eye, if I rightly understand them, tend to reduce all vision to the state in which it naturally comes to us from the periphery of the retina. In a certain way this point of view should bring to the afflicted some solace if, as suggested, the more psychologically important and educative fund of visual knowledge is preserved to the defective eye. For the view is based on the proposition that optical defects of visual definition, within certain limits, may lead to intellectual exercise which eventuates in useful mental development. This suggestion is made in all deference, with the avowed purpose of seeking good in a bad situation. I venture, however, to suggest that it may be worth while for you to study the abundant material presented in your daily practice with reference to the psychologic and intellectual attendants of the minor visual imperfections. For all I know the problem may have been put forward already, tested, and abandoned as fruitless.

I am quite uninformed as to the range of literature prescribed today for students in ophthalmology; but it requires no special knowledge to justify the statement that any curriculum that leaves out the works of Helmholtz, more especially certain popular lectures of his, is essentially incomplete.

When Dr. Jackson asked me to prepare a short paper to present before your conference I had to confess to complete ignorance of any technical theme likely to be of interest to you. But it so happened

that for some years, earlier in life, I had been much interested in the physiologic and psychologic bearing of entoptic phenomena, and of certain radical physical defects in the structure of the eye considered as a camera obscura. Therefore, encouraged by the common knowledge that our most stimulating suggestions often come from a reconsideration of discarded facts, I make bold to bring to your attention, after a lapse of 36 years, some interesting effects resulting from the translucency of the extra-pupillary coats of the eyeball; since it is permitted to quote freely from investigations previously recorded.*

Perhaps the simplest method of getting at the results is to describe the simple conditions under which the phenomena first became apparent to me: If any one looks at the page of a book or at a piece of plain white paper which is illuminated only by the light of an ordinary reading lamp placed on one side, an interesting series of color phenomena may be demonstrated without the aid of any objective color. When the light is on the right side and the partly separated fingers of the left hand are placed over the face so that different portions of the paper surface are seen by each eye, any one may observe that the sheet appears to have a greenish tint where seen by the right eye, while the color approaches a more or less decided red or orange in those parts of the surface whose light enters the left eye only. It is easy to place the fingers so that only narrow streaks of the white paper can be seen by the right eye while the light from the rest of the surface all enters the left eye. In this case the visual ground is colored red with green bands distributed thru it.

Persons whose color perceptions are obtuse have at first difficulty in recognizing these phenomena, but to those who are practised in the use of their sensations, the colors described appear, under certain conditions, with such intensity as to be properly called brilliant.

When the lamp is changed from the right to the left side the colors are reversed; the paper in this case appears green to the left eye and pale red to the

*On the Physiological Effects of Light which enters the eye thru the Sclerotic Coat. *Journ. of Physiology*, 1884, v. 132.

right. The demonstration may be made very effective if a pair of rectangular openings, about 4 x 10 mm. in extent, be cut in a piece of black cardboard and separated by a distance equal to that between the pupils. When a white surface is regarded thru the perforations in the cardboard, four images of the two holes are seen; the inner right and outer left-hand figures are impressions derived from the right eye while the inner left and outer right hand rectangles belong to the left eye. Provided the source of illumination is on the right side the former pair of images is green in color while the latter is pale red. By changing the light to the other side the colors are reversed.

The same facts may readily be demonstrated by holding an ordinary visiting card between the eyes so that but half of the page looked at can be seen by each organ; that part towards the source of light appears green and the other red.

Quite the same contrasting color sensations may be produced by the use of ordinary sunlight whenever it falls directly upon the side of the head; a white surface appears greenish to the illuminated eye and pale red to the other.

These color sensations depend upon the passage of light thru the sclerotic and choroid coats of the eye upon which it is incident. The colors are weakened by light entering the pupil directly from the illuminating source while they are greatly strengthened when it is concentrated by means of a lens upon the sclerotic coat of one eye.

It was not until these facts became clear that I found an allusion to, and a short discussion of the subject by Helmholtz. Smith of Fochabers, in the 18th century, seems to have been the first to have mentioned the phenomena. - But it was left for Brücke, about 1840, to investigate the subject thoroly. In his remarkable article upon simultaneous color contrasts this author proposed an explanation which readily accounts for all the facts that have been observed.

Brücke first proved definitely that the color sensations under discussion are due to light transmitted thru the sclerotic and choroid coats of the eye and not to that which enters the pupil. The light

which has passed thru the semiopaque walls of the eyeball can no longer form definite images but is tolerably equally diffused over the retinal surface. Moreover, having penetrated membranes richly supplied with blood, the light is no longer white but red or rosy in tint. This red light stimulates and fatigues the "red elements" (or "red substance") of the retina, so that when the image of a white object is thrown, by light entering the pupil, upon the background of the eye, it excites with preponderance the resting "green elements" of the retina and appears green, according to the familiar law of simultaneous contrast. To the eye which is not illuminated by oblique light the white surface takes on a tint complementary to the green as a result of subjective contrast.

So far as I can find, this subject seems not to have attracted the slightest investigation since the early work of Brücke, a fact sufficiently remarkable when the universality and striking character of the phenomena are considered.

When an observer beholds the color contrasts clearly brought out by the light which is transmitted thru the sclerotic coat of the eye from a single candle, the conviction is immediate that the eyeballs are translucent in some degree to even the feeblest light falling upon them. Such being the case, it is interesting to inquire what may be the physiologic effects of light entering the eyes by ways other than the pupillary openings.

In the eye upon which the incident light falls obliquely the green retinal elements are aroused or made more sensitive to objective irritation, while the red elements have their excitability depressed. We should therefore expect that objective greens and colors near the spectral green should appear brighter and more saturated when looked at with that eye, while the red and orange tints should lose in brightness and purity.

In the eye not illuminated by side light, in which by subjective contrast the red elements are rendered most irritable, we should expect to find objective colors to be freshened or depressed in an inverse manner.

A single experiment, not necessary to

describe in detail, substantiated these expectations.

On a clear night the stars and planets may be made to take on a faint color when an artificial light is held by the side of the head.

When I look at a star while holding a light in the right hand and pass an opaque card alternately before the two eyes, the star appears greenish to the right but yellowish or orange to the left eye.

Every one who has experimented with colors has remarked the rapid and progressive diminution of their brilliancy when regarded continuously for even a few seconds at a time. The delight bestowed by a simple spectral color is the most evanescent of pleasures. The sense begins to weary from the moment of its excitement and gradually induces positive discontent and depression. In view of this fact it is remarkable that the green foliage of nature never loses its power of refreshing the observer, but awakens rather increased satisfaction the longer it is gazed upon.

It seems not an undue straining of the facts that have already been mentioned to presume that the exhilarating effect of objective green is partly if not solely due to the light which is colored red by penetrating the side walls of the eyes, and which, by gently stimulating the red elements of the retina, keeps up a constant background of contrast for the green light which enters the pupils, thus insuring its continual freshness. In this sense the indirect light may be said to keep the retina in tone for those colors with which nature commonly presents us.

On a bright day in May I stood looking out of a window upon a grass-covered field. The herbage was brilliantly green in hue with a decided tinge of yellow, and aroused in the beholder an indescribable sense of wellbeing. A common pasteboard mask or "false face," such as children use in play, but blackened inside and with the eyeholes reduced nearly to the size of the pupils, was now placed over the face so that scarcely any light could enter the eye except thru the pupils. The landscape appeared very different under these conditions. The green light of the grass lost its brilliancy

and gradually faded; the yellow sensation became stronger, and the general impression produced was that of a field parched by intense heat. A group of deeply green cedar trees seemed to have a rusty hue and the agreeable condition gave way to a sense of depression.

It would probably be profitable to notice whether some cases of color blindness are not due in part to unusual transparency of the sclerotic and choroid coats of the eye. If such be the case we should expect to find colorblind railway employes very differently sensitive by day and by night, to the two classes of signals used.

On first consideration it would appear that light which enters the eye thru its semiopaque coats should occasion a great optical defect in blurring images formed upon the retina and thus diminishing the distinctness of vision. But it must be remembered, as pointed out by Brücke, that light which has thus indirectly entered the eye can no longer itself form images, but is probably evenly diffused over the retina, in which case there is no reason to believe that it has any influence in diminishing the sharpness of the impression derived from a retinal image. On the contrary, from the following considerations, I was led to suspect that the sclerotic light not only does not diminish but decidedly increases the acuteness of vision; and this hypothesis has been supported by the results of all the experimental tests to which it has been submitted.

In his work upon the structure of ciliated epithelium cells Engelmann declares that by the aid of green light, produced by introducing a piece of green glass between the object viewed and the mirror of the microscope, he was enabled to make out details of structure which were imperceptible by ordinary light.

Lamansky reached the conclusion that the sensitiveness of the eye for spectral green, yellow and blue is greater and for violet, orange and red less than for white light.

These facts would seem to indicate that it is the substance of the retina sensitive to green light that is specially differentiated to give visual impressions their distinctness. It follows naturally

that any influence which exalts the irritability of the green visual substance should raise the acuteness of vision above the normal; and we have already seen that light penetrating the side walls of the eye may be regarded as having this effect of stimulating the green retinal element to an excessive and continuous irritability. Whatever the value of these theoretic considerations, experiment shows that acuteness of vision is decidedly greater when light is allowed to impinge upon the side of the eyes than when it is permitted to enter the pupils only.

It would be tedious for me to detail the numerous experiments designed to elucidate the effect of sclerotic illumination on visual acuity.

Suffice the conclusions reached that *"smaller angles can be perceived and parallel lines distinguished when nearer together if light fall upon the eyes from the side than when such side light is excluded."*

Professor Harrington, formerly director of the Astronomical Observatory at Ann Arbor, has called my attention to the interesting fact that the surface of the moon is seen much more distinctly and in detail when an artificial light, as of a lamp or a candle, is held by the side of the head. On trying the experiment when looking at the moon with the naked eye the result is surprising, and no better demonstration of the beneficial effect of lateral light upon the acuteness of vision could be offered.

While I cannot venture to assert that these observations demonstrate that the eye is a better instrument for its optical defects, it remains a most wholesome thought that the human mind has been able to render from the impurities of the raw material provided by its peripheral machine products which go far to enhance the pleasure and usefulness of vision.

REPORT OF TWO CASES OF GLIOMA OF THE RETINA.

CALVIN C. RUSH, M.D.,

JOHNSTOWN, PA.

This paper describes the later stages of glioma of the retina; conditions rare, but occasionally encountered by the experienced readers of this journal.

The appearance of advanced cases of glioma retinae is so unknown in America that the report of the following cases that came to us at the Kung Yee Hospital in Canton may be of value. The first, a boy four years of age, was brought from a distant home. The family history disclosed only that a grandmother had died of the plague, one brother of malaria, and a second brother from an unknown cause. The parents stated that since the age of one year the child had been subject to some form of fever each year for a period of about three months. After the last attack, ten months previous to his admission to the hospital, the parents noticed an abnormal appearance of the left eye. The protusion of the eye developed rapidly.

On admission, the patient's appear-

ance, except for pallor, was that of a fairly well nourished child. The effect of the disease was chiefly shown in nervousness and sleeplessness. Examination showed that the tumor of the left eye protruded anteriorly 50 mm. beyond the orbit and extended from the roof of the orbit above to the ala nasi below, and from the midline of the nose internally to a point 6 mm. beyond the lateral wall of the orbit. The outer canthus was intact. The inner canthus had separated, yielding to the force of the growth. The eyelids had stretched forward over the tumor a distance of 25 mm. Outside the lids the tumor had a red, beefy appearance. The eyeball was not distinguishable in the tumor mass. The distal portion of the tumor showed an ulcerous depression from which pus and blood exuded

giving an offensive odor. Felt thru the lids the tumor was found to be firm and nodular. A preauricular lymph gland on the left side was broken down and had a discharging sinus. There was enlargement of the superficial cervical and sub-maxillary lymph glands on the affected side. The right eye was found to be normal.

The second, a baby two years of age, was brought to the hospital on his moth-

tinguishable in the bleeding mass. The child was anemic and emaciated. There was no involvement of the preauricular or cervical glands.

The treatment in each case was an exenteration of the orbit as a palliative measure. The hemorrhage following the operations was slight. In the second case, what appeared to be liquified fat was found in the orbit around the tumor. After the operation, radium was used.

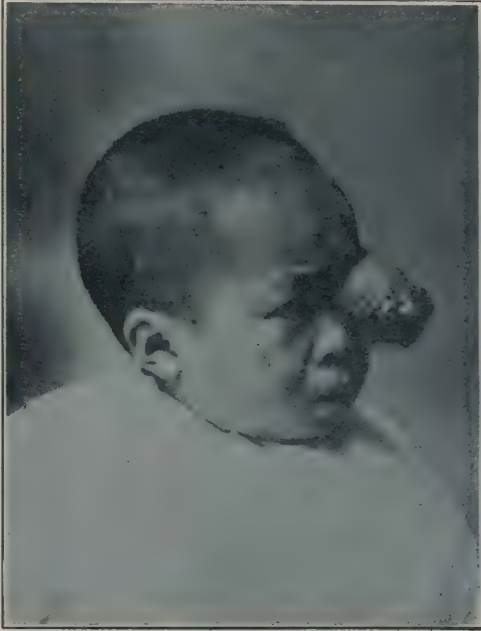


Fig. 1. Glioma of retina in boy four years old. Lesions of eye first noticed ten months previously.



Fig. 2. Glioma of retina in child two years old, first noticed six months before. The swelling of the eye began two months later.

er's back. The history as gotten thru an interpreter showed that the parents had noticed the affection for only six months. The symptoms first noted, as given by the parents were redness, lachrimation, photophobia and pain. After two months the swelling appeared with increase of pain, sleeplessness, pallor and loss of weight.

Examination showed a tumor extending 65 mm. beyond the orbit and with a vertical thickness of 60 mm. and a horizontal thickness of 52 mm. The tumor was red in color, except that the distal portion was a mottled white and green, due to disorganization. Over the latter area was a purulent, malodorous discharge. The eyeball was not dis-

The latter treatment was rather unscientifically applied, as the amount of the radium was unknown, being a recent legacy to the hospital. Healing was comparatively rapid. Case I was still living when the writer left Canton two months after the operation. Case II lived for one month.

The pathologic study of the tumors was made by Dr. James Ewing of Cornell University. The minute structure as shown in the accompanying microphotograph is typical of advanced glioma retinae. Having escaped the confinement of the sclera the tumor grows with such rapidity that the characteristic arrangement of the cells largely disappears.



Fig. 3. Tumor mass from Case 1. (Rush.) The struction of the eyeball has entirely disappeared.



Fig. 4. Tumor mass from Case 2. (Rush.) Showing remnants of sclera A; and optic nerve B.



Fig. 5. Microphotograph from section of Case 2. (Rush), typical of advanced glioma, the tumor growing so rapidly that the characteristic arrangement of cells largely disappears.

MALIGNANT MELANOMA OF THE CHOROID WITH GRADUALLY DECREASING INTRAOCULAR TENSION.

LEE MASTEN FRANCIS. M.D.

BUFFALO, N. Y.

The case of intraocular tumor here reported is of especial interest because its course was followed five years before its removal, and it illustrates the unreliability of intraocular tension, in differentiating intraocular tumor from simple detachment of the retina. Read before the American Ophthalmological Society, June, 1920.

This patient was first seen in May, 1914, at which time he presented himself for refraction and advice as to an increasing haziness of vision, which had gradually manifested itself during the winter. The examination showed a well nourished man of 64, in apparent good health, actively engaged as the executive head of a manufacturing concern.

Muscles: exo. $2\frac{1}{2}$ distance. 5 near.

R. V. = 6/22. +1.50 sp. \subset +0.50 cy.
ax. 180° V. 6/5.

L. V = 6/22. +2.00 sp. \subset +1.00 cy.
ax. 175° V. 6/9.

Add R. and L. +2.50 sp. v. Jaeger 1.

Intraocular tension, tested with fingers, normal. Field limits, normal. Visual media clear save for a few, fine granular floating bodies in the vitreous.

Fundus examination. Both discs of

normal pink-white color, with blurred but traceable margins. Normal physiologic cups. The vessels of the ophthalmic tree are invested with delicate sheaths as they emerge from the disc. Retinal circulation balanced. Retinal arteries brightened, reflexes regular caliber, moderate tortuosity of the smaller branches with some flattening of the veins when crossed by the arteries. Veins normal. Scattered diffusely thruout both circummacular regions are many small, punctate, yellowish, white spots, slightly elevated, crossed by the retinal vessels, with no tendency to coalescence, nor definite grouping as to circulation or each other.

The case was referred to his family physician, a very competent internist with a request for a search for the possible cause of the fundus changes. Blood pressure was reported as 148: twenty-four hour sample of urine, negative: Wassermann tests from two separate laboratories, negative. Radiographs of the alveolar processes showed three lower molars and the upper molars and one root diseased. Otolaryngologic report was negative, except a deviated septum on the left side which interfered with aeration, with possible block to sinus drainage. Sinus radiographs show no shadows. Von Pirquet test, negative.

The suspicious teeth were removed and a submucous resection was subsequently done. Small doses of iodides were ordered.

This fundus picture and vision remained unchanged, the patient being seen twice a year for three and one-half years.

Mid December, 1917, the left vision became blurred. In the left macular region was seen a circumscribed, slightly elevated circular spot, measuring in diameter the width of two or three of the large retinal veins, with definite margins and of a yellowish, white color, similar to the other choroidal lesions with a corresponding defect in the visual field.

Intraocular tension: Right 21. Left 20. Schiötz.

The patient had meantime changed his medical adviser, now being under Dr. DeLancey Rochester. Dr. Rochester was asked to check over the previous examinations, which was done without uncovering any definite etiologic factor.

The spinal fluid examination was reported negative.

The case was under observation until May, 1918, with no observable change in the left eye ground. During my absence in service no observations were made.

He was again seen by me in June, 1919. The right eye was unchanged regarding vision and eye grounds. The left eye showed a smooth, retinal detachment below the macular level and extending toward nasal and temporal sides, with an elevation of about two millimeters. Movement doubtful. Transillumination showed a very faint indefinite shadow above and on the temporal side. Tension: right eye 22, left 17; Schiötz. There was no congestion of the anterior ciliary veins. During the months following there was a gradual extension of the retinal detachment, with no change in the outward appearance of the eye but a gradual diminution of the intraocular tension, which measured 11 millimeters; Schiötz.

Before advising enucleation, the case was referred to Dr. John E. Weeks of New York, for an opinion. Dr. Weeks confirmed the findings as described. He thought that the transillumination shadow, altho indistinct and indefinite, indicated something other than fluid, altho he was unable to determine whether the mass was an exudate or neoplasm. Because of the certainty that the eye would never again be useful as a visual organ, he advised removal.

The patient, unwilling to sacrifice a normal appearing eye, sought further counsel and was sent, on his own request to the late Dr. Samuel D. Risley of Philadelphia. Dr. Risley wrote me he was unable to confirm the shadow upon transillumination and expressed himself as of the opinion that the ophthalmic appearance was not that of a new growth. A von Pirquet test applied and observed by him being faintly negative, and in view of the choroidal changes in the right eye, he strongly advised against enucleation without first trying a series of tuberculin injections for diagnostic and therapeutic purposes. His instructions were carried out by Dr. Rochester with negative results. The intraocular tension had now fallen to 5.

On March 17, 1920, the eye was

enucleated. The following report on the specimen was submitted from the New York State Institute for the Study of Malignant Diseases:

The gross appearance of a cross section of the eye shows a tumor lying in the lower temporal quadrant of the eye, evidently springing from the choroid near the margin of the optic disc. This tumor measured 15x10 mm. and was a slightly nodular irregular ovoid tumor. The surface appeared smooth, was dark gray in color and was of a soft consistency. The retina was markedly detached and contained a clear serous fluid. Cross section of the tumor mass showed a deeply pigmented homogeneous surface.

Microscopically, the tumor varied as to the cellular constituents. There were areas showing many pigment cells and other areas almost free from the same. The tumor was very vascular showing many fine capillaries around which in many places elongated cells arranged themselves. Other areas showed cords of epithelial like cells. While in some places there was distinct stroma, other areas seemed almost free of connective tissue.

Three types of tumor cells could be differentiated. The most common was a large spindle shape cell, having a large vesicular nucleus with a single nucleus.

Other cells were round with hyperchromatic nuclei; while scattered thruout the tumor were large deeply staining cells with one or two nuclei but free from pigment. There were apparently two types of pigmented cells, the one a large irregular cell with long protoplasmic processes densely filled with fine yellowish granules, evidently chromatophores. The other type of pigmented cell was evidently a tumor cell of the type mentioned above but containing fewer granules than the chromatophores. Thruout the tumor were small areas of hemorrhage and between the cells could be demonstrated here and there, free pigment granules.

From this picture, we would make a diagnosis of malignant melanoma, frequently called melanosarcoma, but by some authorities considered as melanotic carcinoma.

This case is reported because of co-existing and independent choroidal changes; the gradually decreasing intraocular tension; the persistent absence of frequent collateral symptoms of intraocular tumor, hypertension and engorgement of the anterior ciliary veins; and the consequent confusion in making a differential diagnosis between exudate, tuberculoma and neoplasm.

HEREDITARY REVERSION PIGMENTATION OF THE EYELIDS WITH HETEROCHROMIA OF THE IRIS.

HARRY VANDERBILT WÜRDEMANN, M.D., F.A.C.S.,

SEATTLE, WASHINGTON.

This is the report of a case of anomalous pigmentation of the skin and iris. The illustration is not a photograph of the patient but is drawn upon a photograph of another person to show the location.

In January, 1911, a girl of sixteen years, came to me for examination into the causes of eye strain. No particular cause was found and this disappeared after following hygienic advice.

The father is a well known business man and has always been accepted as a pureblood white, tho, to the ethnologist, traces of Ethiopian ancestry are apparent in his somewhat kinky hair and rugged cast of countenance. Yet, this particular family claims to be pure American with

an ancestry of English and Irish blood. Indeed, they have traced their family trees back for generations.

The girl was a typical brunette with brown eyes of even color, but my notes of that time, show pigmentation of the somewhat bluish sclera of the left. It was a shock to me to note, in the child of a friend, the evidences of a throw-back, as her features were distinctly negroid, her hair kinky and there was no meniscus of the finger nails; the latter

well known to the Southerners of the old slavery days and a sure sign of negro blood. The father has this, too.

In June, 1920, comes the case again, now a married woman with two children, on account of eye strain and questions me as to the cause of the pigmentation of the eyelids, and as to why her eyes are of different color. Glasses were prescribed for low grade astigmatism.

Interest centers in the general change of her countenance and the development

to those sometimes seen in old negroes and more particularly in half castes with speckled skins. The fundi of both eyes is nonpigmented, but of the brunette type. A peculiar bluish black discoloration of the eyelids on the left side, which extends above the temple on to the forehead, looks just like a "black eye," but there is no history of injury and the coloration is on the Malpighian layer of the skin, showing thru the translucent outer layers. Questioning of the patient

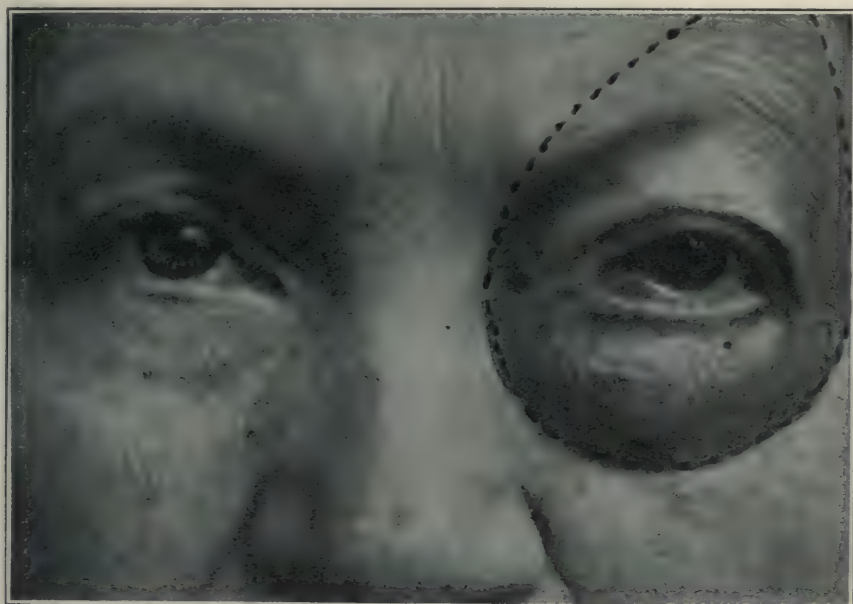


Fig. 1. Diagram showing distribution of pigmentation of lids in Würdemann's case of hereditary reversion.

of onesided pigmentation limited to the left eye and surroundings. Her hair is no longer kinky, but is wavy—perhaps the result of much endeavor by the hairdresser. A sample obtained, shows that it is oval on section. Her countenance is of the European type, but examination of her fingers shows no meniscus of the nails. Her two children have the meniscus present.

The right iris is light brown in color and has distinct markings, while that of the left eye, is a very dark seal brown with no distinct markings. The right sclera is white and the conjunctiva is normal, while the sclera of the left eye is bluish, blotched with pigment and the conjunctiva has pigment patches similar

elicits evident authentic information that there are no other discolored areas on her body, a part of which was submitted for examination. Altho she has had two children, the mammillary ring around the nipple is not at all pigmented.

For obvious reasons, this young woman's photograph was not obtained; in fact, a photograph or even a wash drawing would not show the appearances, satisfactorily. (The diagrammatic representation herewith illustrated shows the area that is implicated.)

COMMENTS. This case is not lentigo or freckles; it is not chloasma or liver spots, for the shade of color is different and is localized. There is no other dis-

ease and no history; in fact, the family history has been investigated and negro blood is denied. Yet the ethnologic aspect is such, that the diagnosis of a color reversion from an infinitesimal amount of negrism, is apparent to the educated eye.

This case is an evidence of the Haeckel and Neo-Lamarckian law, a manifestation of the inheritance of characteristics from forebears, causing variation of type, rather than an acquired anomaly.

Heterochromia iridis is not so uncommon, altho it constituted only about 0.2% of cases at the Zurich Clinic (Lutz).

For discussion of pigmentation of the conjunctiva and of the iris, I refer to article on "Congenital Anomalies of the Eye," by William Frederick Hardy, Volume 4, American Encyclopedia of Ophthalmology, and to his references, all of which deal with these conditions in disease, rather than from an ethnologic aspect.

ORBITAL, EPIDURAL AND BRAIN ABSCESS. AUTOPSY AND MICROSCOPIC STUDIES.

EUGENE M. BLAKE, M.D.,

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NEW HAVEN, CONN.

This is the report of a case which illustrates the danger which may attend acute disease first manifested by ocular symptoms. It was a mixed streptococcus and staphylococcus infection apparently starting with coryza.

The patient, a white male, aged 37 years, was admitted to the New Haven Hospital on June 23, 1920, on my service, complaining of a swollen and painful right eye.

The family history was unimportant.

The past history showed he had never been ill in bed, but had had occasional colds. He had gonorrhea fifteen years before. A few days before the onset of this illness he had a coryza which persisted.

On June 17 the patient first noticed a frontal headache, which was sudden, severe, and soon localized over the right eye. It became rapidly worse and about two and one-half hours later he suddenly became blind in the right eye. After five minutes vision partially returned, everything appearing dark and blurred; this impairment was present at time of admission to hospital. The following morning the right eye was slightly swollen and the pain still more severe. On the 20th he had a chill, followed by fever and sweating. From that time he became rapidly worse, and on the 23rd, entered the hospital. On the 24th he had a chill lasting fifteen minutes. His right upper lid became somewhat swollen and on the morning of June 23rd his whole right eye

was much swollen. The headache remained sharply localized. He had some nausea but no vomiting.

The physical examination showed the patient apparently in some pain. The left eye was normal. The right upper lid was swollen, red, and could not be opened. There was marked edema extending below the ramus of the right mandible. Induration and reddening were present on the forehead and temporal region. There was a slight thin discharge from the eye and marked chemosis. The cornea was clear; the pupil was small and reacted slightly to light. The movements were present but limited. The fundus showed a white disc and dilated veins. The pharynx was injected and there was a marked discharge from the nasopharynx. The teeth were carious and pyorrhea was present. The general physical examination was negative except for the urine which showed albumin, granular casts, red and white blood cells. His blood urea was 22 and nitrogen 44. The white blood count on the 23rd was 20,800 and on the 28th was 26,000.

June 24th under local anesthesia, I made an incision about 2 cm. in length over the orbital ridge at the outer edge of the eyebrows. The orbit was opened

by blunt dissection and a large amount of thick, yellow-brown pus was evacuated. The abscess was found to have burrowed upward between the scalp and skull. A drain was inserted. Large amounts of purulent material drained from the wound. The patient continued to run a septic temperature with maximum rises to over 103° F., and a pulse of about 60 per minute. On June 28th the patient became cyanotic and it was thought best to explore the brain, but the patient died before the anesthesia could be started.

Clinical diagnosis of epidural abscess was made.

AUTOPSY. There was no discharge from ears, nares, or mouth. The right eyeball showed a marked exophthalmos and there was a marked purple discoloration around the eye and extending into the right temporal region. About 2 cm. above and lateral to the outer canthus was an incision 1.5 cm. in length from which bloody fluid exuded. The conjunctiva showed moderate congestion. Edema was more marked in the lower than the upper lid. On exposure of the subcutaneous tissues around the eye, they were found to be edematous and hemorrhagic; some free pus was found, especially in the right temporal muscle which had become markedly involved by the inflammatory process.

Upon removal of the calvarium, the anterior right portion of the dura was found to be covered by a thin, yellow fibrinopurulent exudate, and about 100 cc. of bloodtinged fluid escaped from the same region. The dura was adherent over a small area about 1 cm. in diameter on the lower frontal portion. On removal it was torn slightly; the exudate here was much thicker.

On opening the dura the meninges over the left side were moderately congested. Over the right median and frontal portions a thin film of yellow pus was seen, and a few cubic centimeters of fluid pus escaped. No pus was seen around the base of the brain. A thick patch of pus about 1 cm. in diameter corresponded to that described above on the dura. The sinuses of the meninges as examined grossly showed no thromboses.

The frontal sinus was exposed on its anterior side. The lining mucosa was deeply congested and much thickened.

No pus was seen outside of the mucosa, but on slight pressure gray pus exuded through a minute opening, probably artificial. On further exposure the mucosal sac was found to be filled with pus. A probe introduced into the sinus passed easily into the right nostril and pharynx. On removal of the mucosa no necrosis of bone or opening thru the wall was found. The posterior wall of the sinus was, however, very thin.

The sphenoidal sinus was clear.

The ethmoidal sinuses which were situated furthest posteriorly showed collapse of their mucosal sacs and were free from pus. A single large median cell was found to be densely filled with gray pus. Several small anterior ones also contained pus, and there was an apparent communication between one of these and the frontal sinus, just posterior to the opening of the sinus into the nostril.

The orbital cavity was exposed on its posterior superior aspect. A moderately congested mucosal sac covered the contents of the orbit. When this was incised there was found no sign of inflammation in the contained tissues, fat, muscle, nerve or eyeball.

The consistency of the frontal lobe on the right side was much softer than that of the brain elsewhere.

Sections of the brain showed that the right frontal lobe was slightly larger than the left. The ventricles were collapsed. In the right lobe was found an abscess 3 cm. in diameter, filled with thick, yellow pus. Its edges were sharp. In its lateral planes it was about 1 cm. from the cortex, but in the lower frontal direction it had reached the surface of the brain by a small sinus about 3 mm. in width. The point of rupture on the surface was the area of yellow pus described above.

BACTERIOLOGIC REPORT. Specimens:

- (1) Operative wound.
- (2) Frontal sinus.
- (3) Extradural abscess.
- (4) Brain (longitudinal fissure).

Cultures of operative wound, frontal sinus, extradural abscess, and brain (longitudinal fissure) showed streptococcus nonhemolyticus and staphylococcus aureus.

All cultures showed grampositive cocci in chains which produced neither pigment

nor hemolysis on blood agar plates, and also showed staphylococcus.

A section of the wall of the mucosal sac showed the squamous epithelial lining to be broken in only a few places. The wall contained many dilated sinuses and blood vessels. The interstitial tissue was edematous and infiltrated with cells which were chiefly of the small mononuclear variety, altho plasma cells, large mononuclear and multinuclear, and pus cells were also seen. The lumen of the sac contained a few cells predominatingly polymorphonuclear leucocytes.

The mucosal sac of the ethmoidal sinus was very similar in appearance to the frontal.

The longitudinal sinus was filled with postmortem clot. One side of the attached membranes was covered by a leucocytic exudate; the other showed little change.

A section of the dura was taken from the frontal portion directly over the point of rupture of the abscess. It showed acute necrosis of the dura, infiltration with pus cells, and edema. The inflammatory exudate covering it was also acutely necrosed.

The edge of the abscess showed acute necrosis of the brain substance, and an exudate of cells which were chiefly poly-

morphonuclear leucocytes. These cells had also infiltrated for a considerable distance into the surrounding brain tissue. The blood vessels around the necrotic zone were dilated and around them mononuclear and polymorphonuclear cells had accumulated. A beginning proliferation of fibrous tissues was present, which apparently arose in the fibrous sheath of the blood vessels. The meninges in the vicinity of the abscess also showed congestion and an acute inflammatory exudate.

ANATOMIC DIAGNOSIS: Primary purulent frontal and ethmoidal sinusitis; abscess of the frontal lobe of the brain; localized purulent meningitis; epidural, periorbital, and subcutaneous phlegmon; operation, incision and drainage of phlegmon.

BACTERIOLOGIC DIAGNOSIS: (1) *Staphylococcus aureus*. (2) *Streptococcus non-hemolyticus*.

The history of this case illustrates, only too well, that all suppurative conditions in the orbit should be regarded as of grave significance.

The writer wishes to express his thanks to Dr. M. C. Winternitz, Professor of Pathology at the School of Medicine, Yale University, for permission to report the work done in his Department.

HINTS IN RELATION TO THE DYNAMICS OF THE EXTRINSIC OCULAR MUSCLES WITH SUGGESTIONS AS TO TREATMENT OF STATES OF MUSCULAR IMBALANCE.

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OMAHA, NEBRASKA.

This paper points out what is to be expected of normal extraocular muscles. The near point of convergence is found much more important than the power of convergence measured by prisms. But the abduction power measured by prisms is reliable. Muscle imbalance beyond the limits that may be accepted for normal is to be treated by correction of errors of refraction, muscle training and advancement, or shortening of the weak muscle; supplemented in extreme cases by tenotomy. Read before the Colorado Congress of Ophthalmology and Otolaryngology, July 23, 1920. For discussion see p. 892.

Do we, as busy ophthalmologists, pay sufficient attention, in our daily practice, to the possible existence of anomalies of the ocular muscles? Are we not rather prone to examine the refraction in states of asthenopia, and to content ourselves with the correction of any ametropia detected, without looking very deeply into the manner of the performance of the highly coordinated muscular functions necessary to efficient and easy use of the

eyes? These considerations have suggested to me the presentation of this practical paper under the above title.

It goes without saying that in any estimation of the actions of the extrinsic ocular muscles in the case of our patients, we must bear in mind what should be expected of such muscles in a state of ocular health. We must, therefore, in our clinical work, take into account the amount of adduction, abduction, sursum-

duction, and deorsumduction, to be found in the absolutely normal ocular apparatus of the healthy individual, and also the requirements of the physiologic coordination of these muscular functions to secure the normal, healthy, use of the eyes.

Given, therefore, a perfectly healthy subject with healthy eyes, what should we expect of him in the matter of the dynamics of his ocular muscles? I was so impressed with the importance of this matter some years ago, and so discouraged in finding that in my office testing with prisms the results obtained were at such variance with those enunciated by writers considered to be authorities in ophthalmologic matters, that I determined to undertake a series of investigations into the true physiologic bearings of the question.

In furtherance of this plan, I secured the best possible normal material in the persons of one hundred healthy young soldiers of the U. S. Army, who had never had symptoms referable to their eyes, and published the results of my experiments in *The Annals of Ophthalmology* in January, 1898, under the title, "A Contribution to the Study of the Dynamics of the Ocular Muscles."

The results of these investigations justified me in making the following conclusions, which differed from the views generally held at that time.

1. That the degree of adduction (prism convergence) given by most writers as proper for 6 metres, varying from 30° or 35° to 45°, or 50°, can not be reached by healthy eyes except after practice in the use of prisms. Hence the standard is too high for attainment in the first office examination, and hence the method of measuring the convergence by adductive prisms is unreliable and misleading.

2. That the prism convergence for near (33 cm.) is also misleading and is not an accurate test of the real power of convergence.

3. That the determination of the punctum proximum of convergence, with the calculation of the maximum of convergence in meter angles after the method of Landolt, is the only true test of the real power of convergence, or the positive convergence.

4. That contrary to the generally received views, abduction (prism divergence), can fall well below 6° in healthy eyes, and that consequently, it is wrong to assume, upon this basis alone, that such cases are pathologic.

5. That there exists in healthy eyes no positive, definite relation between prism convergence and prism divergence for distance, and that it is not correct to claim that such eyes should, without practice with prisms, show at 6 metres a ratio between these functions of 3 to 1 (Risley), or 7 to 1 (Noyes) in favor of convergence, not permitting abduction to fall below 6°.

6. That we may expect sursumduction and deorsumduction for distance to be about the same in degree. In about 70 per cent of healthy eyes each function reaches 2° (prism) in amount.

7. That in healthy eyes orthophoria exists in about 60 per cent of the cases for distance, and in about 82 per cent for near, and that it is wrong to hold that orthophoria for near is abnormal and to be viewed with suspicion.

8. That in about 40 per cent of healthy individuals, who have never had a symptom of eye trouble, there may be some degree of heterophoria for distance, and that, therefore, we should not assume that every patient showing a slight degree of imbalance is, on that account alone, in a serious ocular condition.

I still hold to the above propositions then stated.

These conclusions were substantiated by Hansell and Reber in their work on "The Muscular Anomalies of the Eye," published the year following the appearance of my monograph. My results were likewise confirmed by Lucien Howe of Buffalo, and the late F. B. Tiffany of Kansas City, as can be seen by reference to their published works.

Assuming, therefore, that these views are sound, and have been substantiated by other observers thru following out a similar line of investigation, let us very briefly take up the practical side of the question.

1st: As regards the power of adduction or convergence.

In testing this power in our offices, the use of prisms, bases out, is to be condemned as being utterly misleading. In

my series of one hundred individuals in perfect ocular health the highest prism adduction attained was 26° in one case, the average amount being 14.1° .

According to the standard then advanced by the authorities, every one of these men should have been considered in the pathologic class, and it is very likely that many of them, had they strayed into an eye clinic, would have been advised to subject themselves to a series of graduated tenotomies on their external recti muscles. The proper method of determining the highly important function of adduction, or convergence, is to determine the *punctum proximum of convergence*. The result expressed in meter angles will be definite and reliable, and will furnish the *maximum of convergence*.

The use of the familiar dot and line on a card, and a rule, or tape measure, furnish all the apparatus necessary. One should gradually approach the card to the patient's eyes, and as soon as one eye begins to oscillate or turn outwards, note the distance from the eyes at which this takes place. This gives the *punctum proximum of convergence*. Divide this distance into 100 if registered in centimetres, or into 40 if measured in inches, and the result will be the maximum of convergence in meter angles.

In my experience a maximum convergence of 13 meter angles is necessary for comfortable and satisfactory use of the eyes in near work. An individual, therefore, should be able to see the dot singly at 3 inches from the eyes, and if he cannot do this, his power of adduction is not up to the proper standard.

2nd: The determination of the *abduction* (prism divergence) for 6 metres, by measuring this function by means of prisms, bases in, is, on the other hand, free of the objections to be made against the use of prisms to measure the adduction (prism convergence). The degree of prism divergence in healthy eyes is quite definitely fixed, and we cannot, as a rule, increase the amount first determined in any given subject by further practice with prisms (Duane).

The standard power of *abduction* in healthy eyes is about 7° (prism). In my 100 healthy subjects the average was 6.88° .

By dividing the prism abduction by 7, as is well known, we get the abduction in meter angles. This is the *minimum of convergence* of Landolt, and is *negative*. The usual amount in normal eyes is 1 meter angle.

It is important to determine the amount of *abduction* as a guide to treatment in conditions of weakness of *abduction*, for, if the former is much increased, we may assume an overaction of the external recti muscles, in addition to an insufficient action of their antagonists. It should be noted, however, that the power of abduction in any given subject, with seemingly healthy eyes, can be decidedly higher, or lower, than 7° . Duane holds that the abduction (prism) amounts quite regularly to from 6° to 10° , and that variations above or below these limits must be regarded as distinctly pathologic. Noyes states in his "Diseases of the Eye," that abduction for distance should not fall below 6° , and that an abduction of less than 5° will in most cases be pathologic.

If these limitations, as given by these writers, are correct, 26 of my 100 absolutely healthy cases would fall in the pathologic class, for these 26 persons showed the following:

Prism Abduction of 3°	in 3 cases
Prism Abduction of 4°	in 14 cases
Prism Abduction of 5°	in 5 cases
Prism Abduction of 11°	in 2 cases
Prism Abduction of 13°	in 1 case
Prism Abduction of 16°	in 1 case

It would seem, therefore, that the practical point of view for the ophthalmologist should be to this effect, that he should not establish too inflexible a boundary between physiologic and pathologic degrees of abduction, but should consider that, while fixing the average normal abduction (prism) for 20 feet at about 7° , our patients, in the absence of symptoms of muscular asthenopia, might show a variation to some extent in either direction without of necessity falling into the pathologic class.

3rd: Sursumduction and deorsumduction normally are about the same, i. e. 2° (prism) in amount. Hence, if, in patients showing a lack of vertical balance, we find a decided difference between these functions, when tested with vertical prisms, bases down, or bases up, we may

assume the existence of a pathologic state.

4th: The indications of conditions of heterophoria with suggestions as to treatment of states of muscular imbalance.

Be it noted that in this discussion parietic conditions, and the various types of strabismus have no place. Slight, or moderate, degrees of heterophoria are possible in 40 per cent of healthy subjects.

In our office work we should give our patients the benefit of this fact. The great majority of these cases are innervational in type, due, in many instances, to altered conditions introduced into the relations between accommodation and associated muscular functions by uncorrected errors of refraction. We should, therefore, in the treatment of these cases carefully correct the refraction, as an essential preliminary, and require this correction to be worn constantly. Presbyopic correction should also be attended to.

In many cases, in which the heterophoria is slight, or moderate in degree, this will be all the treatment required, but in instances manifesting a higher degree of imbalance something else in the way of treatment will be necessary.

Let us now discuss very briefly, and in a very practical way, exophoria, with insufficiency of convergence of the visual axes for the near point, esophoria, and hyperphoria. Cyclophoria, so-called, I do not consider of sufficient importance to be injected into this discussion.

(a) Exophoria: Having determined the existence and degree of exophoria by the phorometer, or Maddox rod, what does the presence of this anomaly signify? Doubt is at once thrown upon the function of convergence. We should proceed to determine the punctum proximum of convergence, and estimate the maximum of convergence in meter angles, as before indicated. Bear in mind this fact that one can not accurately measure the degree of this function by means of adductive prisms. We should then determine the abduction, or minimum of convergence, by the use of abductive prisms. The maximum of convergence should be about 13 meter angles,

and the minimum of convergence 1 meter angle.

If the maximum of convergence is appreciably below 13 meter angles, the case is one of insufficiency of convergence, and, if in addition, the minimum of convergence should be much above 1 meter angle, we may suspect an overaction of the external recti muscles as complicating the case.

Insufficiency of convergence is an innervational condition in the immense majority of cases. Tscherning says in his "Physiologic Optics," "It is not in the muscles; it is in the innervation of convergence that we must seek for the cause of the deviation."

The scope of this paper will not permit of a discussion of the symptomatology and other points in the etiology of this most important condition, and I shall, therefore, beg leave to refer to a paper read by me before the American Academy of Ophthalmology and Otolaryngology at the Cleveland meeting last October under the title, "Practical Considerations in Connection with Insufficiency of Convergence of the Visual Axes." (See A. J. O.; April, 1920, p. 269.)

Given a case of muscular asthenopia, in which an exophoria of important degree exists with a maximum of convergence falling well below 13 meter angles, what should one do?

The refraction should be first corrected as an essential preliminary step. Next, if the muscular asthenopia continues, we should attempt to secure an improved innervational impulse from the hypothetical convergence center in the brain cortex by exercises with *adductive prisms*, or by other methods calculated to train the adduction. I am opposed to the use of prisms, bases in, to be worn by the patient, and have not prescribed such for many years. This use is unscientific and tends to increase the degree of convergence weakness. If the measures noted are without result in the way of securing relief from the distressing nervous symptoms of this type of asthenopia, then operation is certainly indicated. If the maximum of convergence does not fall below $6\frac{1}{2}$ meter angles, nonoperative measures may possibly prove successful. If they do not, however, or if the maxi-

mum of convergence is lower than 5 or 6 meter angles, to start with, then operation will be required.

What type of operation should be selected? Not a tenotomy of an external rectus muscle certainly, for it would be most illogical to weaken a muscle none too strong of itself to assist a weakly acting antagonist. The rational, scientific method is to take steps to enable the weakly acting muscle to perform its duty more efficiently—to, in fact, increase its power. I believe firmly in working on the positive side—not on the negative, and the results of twenty-two years of practice along these lines go to prove the truth of this proposition.

The operation of election in such cases is in the nature of an advancement, or shortening, of the internal rectus muscle of one eye, and if sufficient result is not secured by this means, then a similar operation upon the internal rectus of the other eye at a little later period. This is thoroly in accord with the views of Landolt.

The method, which I would advise, and which I have practiced since 1898, is a modification of the tuck method with the buried catgut suture, introduced by the late Dr. Francis Valk of New York City. This operation has been described in my paper before referred to.

If the convergence insufficiency is of a type and degree that operation as advised, even upon both internal recti muscles, has not been sufficient to secure relief, then we may consider the advisability of a tenotomy of one of the antagonists in addition.

It must be noted here that all cases of convergence weakness do not manifest exophoria for distance. Orthophoria is frequently present, and even an apparent esophoria may be in evidence. This latter need not obscure the diagnosis. The insufficiency of convergence as determined by the method advised is positive, and furnishes the key to the situation. This pseudo, or apparent, esophoria may be explained as the result of a constant effort to maintain sufficient convergence to avoid heteronymous diplopia for the near point, a partially spastic condition of the internal recti muscles being induced, which would be responsible for the tendency of the visual axes to cross within infinity.

This condition does not in any way interfere with the treatment of the convergence insufficiency for the near point, whether by prism exercises or by operative measures. It will disappear after the correction of the insufficiency of convergence.

(b) Esophoria: In the majority of cases of esophoria, this anomaly is associated with accommodative strain, as in hypermetropic conditions, tho we may find this form of imbalance in myopia, or even in emmetropia. Some observers consider esophoria due to convergence excess (Hansell and Reber), some as the result of divergence-insufficiency (Landolt), and some as caused either by convergence excess or by divergence insufficiency (Duane).

In moderate degrees of esophoria it is probable that accurate correction of the refractive error, if any be found to exist, will be sufficient to relieve the state of muscular imbalance, and such treatment should invariably be used before making any other attempt. If the tendency to convergence should continue, nevertheless, one must choose between the constant use of prisms, bases out, in combination with the ametropic correction, and surgical interference. No advantage will be gained by exercises with prisms, bases in, to stimulate the power of abduction, and this method is not recommended.

In an esophoria of slight or moderate degree, say, up to 6° (prism) in amount, the ametropic correction may possibly be all that will be required. If, however, such a fortunate result should not follow, prisms, bases out, should be combined with the glass correction. It is best to correct half of the esophoria and divide the correction between the two eyes. It is almost certain that the prisms will have to be increased up to the full amount of the original esophoria, and probably to a greater degree as the condition is liable to increase from their use. If the esophoria should advance beyond 8°, or if it should be 10° to start with, then operation is indicated in the presence of continued asthenopia.

What should our operation be? A tenotomy of the internal rectus muscle of one or both eyes, or should we perform an advancement of one antago-

nist, or both, in extreme cases? In this condition, also, I adhere to the views of Landolt that an operation in the nature of an advancement of one or both antagonists is indicated, and is the operation of election. The tuck operation again applies here as efficiently as it does in convergence insufficiencies, and the technic is the same with the exception that the external rectus muscle is subjected to operation instead of the internal.

(c) Hyperphoria: As indicated in the results of my experiments, we may expect to find a slight degree of hyperphoria, up to about 2° , in 7 per cent of individuals with healthy eyes. Practically, therefore, we should give our office cases, showing such a degree of this type of muscular error, a chance to secure proper vertical balance by the use of lenses to correct any existing ametropia before proceeding to use treatment more definitely directed against the hyperphoria seeming in evidence.

We must remember that a spurious hyperphoria may exist, which may disappear after the correction of an error of refraction, or the relief of an esophoria or exophoria. In conditions of hyperphoria amounting to from 4° to 6° this will rarely be found possible. In such cases, in which the asthenopia persists after the correction of the refraction, and where exophoria, or esophoria, is not present, we may assume that the hyperphoria is permanent, and that we will, at least, be forced to make use of prisms vertically placed for constant use. The prism strength should be one half of the manifest hyperphoria to commence with, the prism correc-

tion being divided between the two eyes, base down before one and base up before the other. The hyperphoria may in all probability show a constant increase under this use of prisms, requiring a commensurate increase in the prism strength employed.

When the manifest hyperphoria reaches 6° (prism) it is time to operate. In the case of the superior and inferior recti muscles in hyperphoria, just as in the internal and external recti in lateral imbalance, the tuck operation is the surgical measure of election. I placed the lowest limit for operation at 6° (prism) of hyperphoria for the reason that the smallest tuck that can be taken in either the superior or inferior rectus muscle will have this much effect. The depth of the smallest tuck that can be taken will be about 2 millimetres, and this will be followed by about 6° (prism) of effect. It must be noted that the effect in either of the vertical muscles is relatively much greater than would result from the taking of a similar fold of tissue in either of the lateral muscles. This fact has been forced upon me in a very practical way at the operating table.

In correcting a given condition of hyperphoria, one can take the tuck in the inferior rectus of the hyperphoric eye, or in the superior rectus of the hypophoric eye.

I shall add, in conclusion, that the effect produced in the tuck operation for any type of heterophoria should be tested at the operation by the use of prisms with the test object, preferably a candle flame, at 20 feet. Since the operation is done under local anesthesia, this is perfectly practicable.

NOTES, CASES AND INSTRUMENTS

OPERATION FOR RESTORING CANALICULUS.

FRANK W. DEAN, M.D.

COUNCIL BLUFFS, IOWA

Following the probing of the nasal duct or treatment of dacryocystitis, the canaliculi are frequently slit in such a manner that the normal action of the

lacrimal apparatus has been destroyed. To restore the canaliculi to their proper function, I do the following operation, under a local anesthetic. Satisfactory anesthesia may be secured by packing the canaliculus with cotton dampened with adrenalin chloride and a 10 per cent solution of cocain, leaving the cotton in contact with the tissues for about ten minutes.

Using a mouse-toothed forcep and a small, sharp-pointed pair of scissors, I dissect off a strip of mucous membrane from the inner side of each lip of the opened canaliculus, leaving about 1 mm. of mucous membrane on each lip at the end to form the new punctum. Also leave a strip at the bottom of the slit to form the lumen of the new canaliculus. Bring the raw surfaces together with sutures.

I remove the sutures after four days, and wait a week longer to allow the union to become firm, before testing for results by probing.

I report a case in which the canaliculi were especially mutilated, on which this operation was performed:

Mrs. L., 23, came with the request that I probe her right duct to relieve tearing. On examination, I found that both canaliculi had been slit completely from one punctum to the other, leaving a gaping, horse-shoe shaped opening, thru which I could look into the lacrimal sac. The nasal duct was patulous, allowing water to pass down freely; in fact, air was forced into the patient's eye when she blew her nose. The cause of the tearing was evidently the destruction of the suction of the lacrimal sac, due to the wide open canaliculi.

I performed the operation for restoration as just described, freshening the edges of both canaliculi around the bend of the horseshoe, uniting the two lips with three sutures.

The following results were obtained: The new puncta and canaliculi will just pass a No. 5 Bowman probe without force. The puncta lie in proper position. The disagreeableness of forcing air into the eye from the nose is relieved. The normal function of the lacrimal apparatus is restored and the patient is relieved of tearing.

PAINLESS SUBCONJUNCTIVAL INJECTION.

C. ARBUTHNOT CAMPBELL,
Steubenville, Ohio.

This is a report of a painless technic for giving subconjunctival injections

that I have used in a number of cases with gratifying results. The therapeutic value of subconjunctival injections of various drugs in various conditions is beyond the domain of this report. The technic to be described I have used in children from seven years of age to adults beyond sixty years of age, and their statements have always been the same: "It was painless." The hypersensitive will manifest their condition with some complaint when they discover that their "eye is to be injected," but our experience must allay their phantasms.

All solutions used must be freshly prepared, otherwise a precipitate may occur. Especially is this liable to occur with the cyanid of mercury when it is the active drug. The solutions and syringe should be sterile. The bulk of fluid injected depends on the operator, but when large quantities are to be used, it is better to employ the procain as an anesthetic than cocain. My anesthetics of choice are cocain hydrochlorid 1.5 per cent, or procain 2 per cent, aqueous solutions. The following active drugs I have used: normal salt, hyper- and hypotonic salt, dionin and cyanid of mercury.

In detail it is as follows: To the fresh sterile solution of the active drug add fresh sterile solution of the anesthetic. I do not boil them together for sterilization. The procain or the cocain may be in strong enough solution, so that one or two drops may only be necessary to be added to the active drug solution, thus having no appreciable diluting effect on it, and at the same time giving it a 2 per cent procain or a 1.5 per cent cocain. The conjunctival sac is now anesthetized by putting in it one drop of a 4 per cent cocain solution, repeated every two minutes for four applications. Then with the sterile syringe inject the desired solution *slowly*. It is not necessary to give morphin or codein. No special after care is necessary.

I will appreciate knowing of any failures with the above technic.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

AUSTRALASIAN MEDICAL CONGRESS

Section of Ophthalmology

Held in Brisbane, August, 1920

Dr. A. L. Kenny, Melbourne, President
Legal Recognition of Sight Testers.

The presidential address dealt with the repeated attempts made by opticians to secure legal registration as sight testers. The section would assist the opticians in any efforts made to secure a better education in their craft; but refused to have anything to do with the legal recognition of sight-testing, on the part of people who had not received a medical education. The decision was endorsed by the Congress.

Discussion on Iritis.

An interesting discussion on iritis was opened by Dr. J. C. HALLIDAY, of Sydney, who gave a judicial summary of the present attitude.

Sir James Barrett, Melbourne, agreed with Dr. Lindo-Ferguson's classification of iritis so far as causation was concerned. He thought that approximately a third of the cases were syphilitic in origin and that about half the cases corresponded to a clinical type called rheumatic. There was no evidence that these cases had anything to do with rheumatism, but that there was abundant evidence that they were powerfully influenced by the exhibition of salicylates. He thought it desirable to retain the term rheumatoid iritis because everyone knew what it meant. Of the remaining cases a number might be due to septic foci, pyorrhea, etc., but he must confess to a skeptical attitude; tens of thousands of people had septic foci and did not get iritis.

Dr. Lockhart Gibson, of Brisbane, said that he had always found by far the majority of iritis cases to be either what he still calls rheumatic or syphilitic. He was not wedded to the term "rheumatic," except for expressing a variety of iritis which he expects to get

well if treated in the acute stage with treatment supposed to be specific for acute rheumatism. He had always put such cases in bed, and given them 20 grains of sodium salicylat every two hours, night and day. For the last seven or eight years he had given 40 grains of sodium citrat with each dose of the salicylat. It prevents disagreeable symptoms from the salicylat.

Atropin is the only local treatment he uses, 1/200 grain, four hourly, more or less. He expects an acute case with posterior synechia, or an occluded pupil, to show a dilated pupil and greatly improved sight in 30 hours. The doses are continued, either two hourly or four hourly, according to the case. Sometimes if they are reduced too soon he has to mount up again.

Latterly he has paid attention also to possible local infection as a cause. But in the past he has never failed to get such cases well, if seen in the acute stage, without reference to the teeth or tonsils. The treatment is as specific for so called rheumatic cases as mercurial inunction is for syphilitic ones, but the doses must be as large as he gives. He did not deny the possibility of these large doses acting thru disinfection of genito-urinary tract.

Visual Standards for Military Recruits.

SIR JAMES BARRETT opened a discussion on the subject of visual standards that should be required for military recruits. He pointed out that thousands had been rejected, owing to the imposition of a standard of visual acuity which was unnecessarily high. It had been found in Egypt that vision of 6/24 in the right eye, provided the left was not blind, was sufficiently good for most purposes. He thought that the fixation of high standards was due to a misapprehension. In the case of sailors and railway men visual acuity of less than 6/12 involved secondary color blindness, which was a

very serious matter; but the rank and file did not need to possess good color vision.

He accordingly recommended that the standard of vision be fixed as 6/18 in the right eye provided the left eye was not blind; blindness being defined as inability to count fingers at three feet distance. Or if shooting be permitted from the left shoulder vision of 6/18 in either eye, provided always that there was no progressive disease in the better eye. This visual acuity might be obtained with or without glasses, and it seemed to him that it did not matter what a man saw without glasses. The Army Council at the end of the war had fixed this standard of vision for motor drivers but without glasses, so that it was quite evident that the standard was sufficiently high. For "B" class men he suggested vision of 6/36 in one eye.

For officers he recommended the retention of the Army Council Standard of April 2, 1918. For Commission in the Royal Air Force the standard laid down by the Army Council in 1917, and for the Tank Corps the standard fixed towards the conclusion of the war. The recommendation was unanimously endorsed by the Section agreed to by the Congress and was ordered to be submitted to the Government of the Commonwealth for its consideration.

Optic Neuritis from Lead Poisoning.

Dr. Lockhart Gibson, of Brisbane, gave a convincing demonstration of optic neuritis in children, due to lead poisoning. The houses in Queensland are built on piles on account of the white ant trouble, the children play on the verandas which are elevated a long way from the ground, the sun pulverizes the white paint on the verandas and from the hands of the children the paint gets into the mouth. Some criticism was expressed respecting the theory, but as optic neuritis in children is very rare in Southern Australia and is quite common in Brisbane; and as some of the children have the blue line on the gums, the general opinion was that the case was proved. Furthermore when deionization was effected, by passing a current thru the

body from hands to feet, lead was found on the negative pole. The remedy suggested is to substitute zinc for lead as a basis for the paints.

A Recording Scotometer.

Dr. E. O. Marks exhibited an ingenious and effective large scale scotometer which was provided with a self recording apparatus.

COLORADO CONGRESS OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

DR. MEYER WIENER of St. Louis, presiding.

Friday, July 23, 1920.

DR. W. A. FISHER, of Chicago, illustrated the use of kitten's eyes to demonstrate cataract operations.

Safety Procedures in the Extraction of Cataract.

Dr. H. W. Woodruff, Joliet, Illinois, stated he did not propose to cover all of the safety procedures that it is necessary to use before, during and after the extraction of cataract, but only to mention a few which he considered important and failures occur when attention is not given to them. He then read the paper published in the AMERICAN JOURNAL OF OPHTHALMOLOGY for October (see p. 739).

DISCUSSION: Dr. J. H. Thompson, Kansas City. When oculists get together they are sure to talk about cataract operations because it is the most momentous operation that they are called upon to do, one that requires great skill and one that we like to talk about. There are many things to talk about in reference to a cataract operation, but I am glad the reader brought up the loss of vitreous.

Once three or four oculists met and one said, "I have a couple of cataracts to show you." They all went to see the operations, and he lost both eyes by loss of vitreous. The reason was; he was excited, trying to show off, talking too much to the patient and was too long at it. If a man after he

touches the knife to the eye is over a minute and a half completing the operation he gets into trouble. It is an operation that should be done in that time, and must be done like clock work—first-class assistants, incision large enough, no talking, no comments, and just go right along. If there is delay accidents happen.

The loss of vitreous, as a rule, comes from making too small an incision; another cause of the loss of vitreous, and a very common one, is making a puncture in a mature cataract, and not splitting the capsule sufficiently. Consequently you can not push the nucleus out of the little hole that you have made, and you try to push it out until something collapses and you have loss of vitreous, and the only thing to do is to use the hook. It can be taken out better with a hook than with a spoon.

After you have lost vitreous, and the eye has healed up and the patient gone home, there may be detachment of the retina in two or three months. I saw a man operate a hundred times without an anesthetic, and never lose vitreous once because he did it very rapidly. If prolapse occurs shall we cut the vitreous off? When we get into this trouble the best thing to do is not to interfere with it too much.

Twice I have lost a lens in the vitreous, and let it alone. That lens came to the surface when I dressed the eye the next day, even into the conjunctival sac, and the same with a dislocated lens. With a large incision the majority of the lenses come to the surface, and then you can take it out with a hook. I would not try to squeeze it out, because you will squeeze out all the vitreous before you get it.

Another thing I would like to mention is, that in the general preparation, we are too anxious to be so awfully clean. I think people clean up too much. Try to keep the edge of the lid as clean as you possibly can. General surgeons leave the blood alone. In many instances the surgeon himself infects the eye when he goes to operate. Fortunately danger of infection has become very slight, especially since

men have taken such care in never touching the eye with anything but a clean instrument, and being so careful to keep the knife clean. That is where the infection used to come in, from an unclean knife. Usually I clean a knife in absolute alcohol and then water; and then have it perfectly dry ready for the operation. I very rarely have an infected eye; but I do get them.

Dr. John M. Banister, Omaha. I had an accident once in doing a cataract operation that jeopardized the eye very much. I made the section of the cornea and had done an iridectomy, and everything seemed satisfactory; and then suddenly the man went into an epileptic fit. But we did not get serious harm, and came out with first class results. I mention this to show how we may encounter danger.

Dr. W. A. Fisher, Chicago, Ill. I confess that I am the doctor that first began to follow Smith's idea of using cocain one time in each eye, waiting three minutes and finishing the operation. I also confess that I operated 600 times in Smith's clinic in one month, and the anesthetic was satisfactory.

Smith has done now about 50,000 cataracts, and he used the anesthetic only one time for each eye. I am sure if he needed cocain more than once he would use it. But I adopted the method spoken about, of using cocain more frequently, not for any other purpose than anesthetizing the iris, so that the patient does not feel the iridectomy.

A safety procedure that the reader did not mention was, never to allow the patient to look down. The toilet can be done with the patient looking up just as well as down. Another one is the pressure should be made from below, with the patient looking up all the time. Another, the assistant should be a trained nurse; then you always have a good assistant; one nurse can train another nurse. If you put a little cocain in the patient's eye, they can get a technic of holding the lids open that is remarkable, and they can get this technic before the operation is begun, and then you can do away with

speculums. I am sorry Dr. Vail is not here to tell you what a beautiful hook he has to hold open the lids.

Another safety procedure, the greatest of all, is to operate as many times as possible on animals before you operate at all on patients, preferably on kittens. Another safety procedure is to prepare for complications. Smith's spoon and the needle I have described, should be mastered before operation by any method is attempted.

Another safety procedure is to close the eye when you get thru. Don't do anything else afterwards. A great many do a great many things after they get thru the cataract operation.

The last safety procedure is when you get thru to bandage the eye and don't look at it; let nature have a chance to heal it up.

Dr. Robert Scott Lamb, Washington, D. C. To begin these safety procedures at the beginning, one of the things we take least into consideration is the temperament of the patient. The patient should be studied. Another one that we can use to advantage is a little training with the patient. Go thru a little course with the patient before you really intend to operate, to find out just how intelligent the patient may be in following directions, as to looking to the right, the left, up or down, immediately according to the direction, but caution him to look slowly, never making any quick motions with the eye.

Another point that can not be emphasized too much is the necessity for cleanliness. That does not mean, as I have seen done time and again, turning the lids inside out and scrubbing the surface of the lids just before operating with cotton saturated with bichlorid solution. I think that is carrying the thing to the extreme. But the margins of your lid should be clean.

Now, you not only want plenty of room for the extraction of the cataract, but you want plenty of palpebral fissure. In getting that it is wise either the night before, or the day before, to do a canthotomy. It is a practice of mine to close the tear ducts, in order

that there may be no infection coming up from the nose thru the tear sac. I believe in White's scheme, of packing the cul de sac with bichlorid ointment, the night before, holding it in. I also believe in the use of bromides, either by mouth or by rectum the day before or the night before. An hour before the operation I have 1/150 grain of atropin and a quarter of a grain of morphin injected.

I quite agree with the necessity for a large incision, and on the decided advantage of starting your incision with a knife and completing it with the scissors. I have done it many times and would rather do that than get my iris caught, roll up on the knife and cut thru with an irregular iridectomy, and it is not very difficult if you have a good pair of scissors to make this complete incision.

The eye should be very thoroly anesthetised, whether you are in the habit of using holocain or cocain, and do not be in too big a hurry, for if your patient is under control you have no need for hurry, but you have need for very careful attention to every detail.

Occasionally it seems advisable to do a capsulotomy, where you have very little aqueous, and I don't know of any better scheme than that that was suggested by Doctor Sym, of a circle following near the edge of the equator of the lens, and then take out the base of capsule by the forceps. You have your whole anterior capsule. The posterior capsule has rarely caused you any trouble. Whether to irrigate the anterior chamber after doing a capsulotomy, is a matter of personal choice.

Dr. William H. Crisp, Denver. One important precaution that has not been mentioned is that of discovering whether your patient has any decaying teeth or dental abscesses. I saw a case several years ago where an eye had been lost the previous year, and where the conjunctiva was still discharging in that same eye, and where, after I got rid of a number of bad teeth, not only did we get a successful operation on the second eye, but the old stump which had been discharging previously also cleared up entirely; so I believe it

is a wise precaution to investigate the mouth especially of your patients for focal infection.

In my opinion the crux of the whole procedure in the operation is sufficient anesthesia. I believe we are too much afraid of the use of cocain because of fear of reaction by bursting of blood vessels. With a perfectly quiet patient I usually put a drop in the other eye a little before operating.

Dr. Woodruff. As I said when I started to read my paper, I had no intention of covering all of the safety procedures that should be taken. I think perhaps I made a mistake in choosing my title, because only one has mentioned the particular thing that I wished to bring out.

Dr. Thompson's suggestion, with reference to making the operation rapid may be right or not. The incision may be made too quickly, and in cases I have suggested, if the incision had been made quickly the vitreous would have followed the incision; therefore, it is a matter of judgment whether to make the incision quickly or to complete it rather slowly. Of course it is not advisable to waste time.

I agree with Dr. Thompson about not cutting off the vitreous. I have never seen any good from an attempt to cut the part prolapsed. It is well to get the eye closed as soon as possible.

Dr. Fisher inadvertently fell into a trap. I did not refer to him. I referred to Dr. Greene, of Dayton, as the man I saw operating one afternoon—attributing his failure to the fact that he did not have sufficient anesthetic.

I did refer to Dr. Fisher in the second instance regarding his adopting Dr. Smith's method of two per cent solution of cocain, one drop. I am a great admirer of Dr. Fisher. He is very definite and positive in his statements, but he has changed wonderfully since he first came back from India regarding that.

Now he uses subconjunctival injections of cocain; he believes in complete anesthesia. The point that I particularly want to impress you with is

this: that there are certain types of cases in which extra precautions must be taken, no matter what your ordinary method of operating is. These particular cases require particular care. For instance for a patient that is mentally deranged, if you make the ordinary incision with one or two or more sweeps of the knife, you are sure to have vitreous flow. In those cases do not complete the incision; the vitreous will not escape thru a small incision; so don't complete the incision then, but take your speculum and the knife out, and then complete it with the scissors. If you complete it with the scissors you can get your incision made without losing any vitreous.

Delirium Following Cataract and Other Eye Operations.

DR. W. A. FISHER, of Chicago, read the paper published in A. J. O. for October, p. 741.

DISCUSSION. Dr. Melville Black. If we were all neurologists we might understand this subject better, or it might possibly be more confused. The psychology of this condition is of importance. I think the man who advocated that the question of elimination should be carefully looked into in these cases struck the keynote. Most of these people who become delirious after cataract extraction are merely intoxicated. The last case I had of this kind had a complete suppression of urine; and as soon as we succeeded in restoring that function the patient showed an improvement. That is, however, only one of the causes.

The man who advocated the idea that these old people away from their friends, in a hospital, hearing strange noises, strange voices, were singularly influenced by those surroundings, also struck a very important note in the causation of this trouble. There are a number of causative factors unquestionably in these deliriums after cataract extraction. It is remarkable that very few cases have been reported where the cataract was fully mature in each eye, and the patient had already undergone a considerable period of blindness before being operated upon. Hence, the importance of giving these

people the seeing eye as soon as possible, after extraction. It is my custom to give the patient the use of the eye that was not operated upon, providing he sees with it, on the fourth day, and even if he does not see with it, but has only a light perception with that eye, I give him the benefit of that.

It is also exceedingly important that those patients be allowed to see their friends. I think Dr. Fisher is absolutely right on that point. Every time that it can it should be brought about, that some member of the family is present night and day with these old people. They do not make new friends rapidly, and while they may seemingly become friendly with the nurse who is in attendance during the day, there is a new nurse at night. There are different sets of nurses night and day, unless the patient has a "special"; and if they can have some member of the family present all the time it is a great factor, in my opinion, in preventing these deliriums.

Elimination after cataract extraction, especially by the bowel, is not always highly desirable. It is usually my practice to let these people go forty-eight hours without a bowel movement, if there is no special tendency on the part of the bowels to move. The giving of a cathartic and stirring these people up is not my practice after a cataract extraction. Urine suppression, however, has to be closely watched, and these people should be encouraged to drink plenty of water. It is a subject, as you will observe by the very extensive review of the literature given by Dr. Fisher, that has caused considerable anxiety on the part of operators, and there is a great multiplicity of opinions regarding the causation and the management of these cases.

I have long since abandoned the idea of keeping a cataract case in a dark room after operation. My opinion is that it is entirely unnecessary. I keep these patients in just as well lighted rooms as any surgical case. I use a black mask over the eyes, which affords all the protection that is necessary from light; and I give the patient the use of the unoperated eye upon the

fourth day. I have never seen a case of delirium occur after that period. The cases I have had have all been before the fourth day. Fortunately we do not see many and when we do see one we hope it will be the last. The last one I saw was a woman who lived near Longmont. Her son got to the hospital within a few hours after he was called up by phone, and he said, "I believe if I could take my mother home I could manage her." I said, "Take her home; it is the best thing you can do. Take her right home with you now." He did so, and telephoned me the next day that she was very much better, and the day following she was absolutely all right, showing what an influence the home surroundings had in this particular case.

Dr. D. H. Coover, Denver. I think Dr. Black struck the keynote when he said to take these old people home. We all know that old people have a dislike for hospitals. In my early days, before we had cocaine, I did all my operations in the home, and I have never seen a case of postoperative mania in the home. As soon as I put my patients in the hospital I began to have postoperative mania, and I attributed it to the lack of home surroundings. All postoperative mania I have seen occurred in the hospitals. It seems to me it is not due to senility; it is due to a lack of companionship. You should let friends be around the patient. Talking does not hurt a cataract case, and the patients feel more at home. As Dr. Black has said, the nurses are all strange to them, and they get very little attention unless you have a special nurse. But where I have special nurses I have them ready to talk to.

Dr. H. W. Woodruff. I should like to put on record one case of delirium following cataract extraction I have had, of a man more than seventy years old, who was operated on without any special difficulty during the operation, but that night became insane and never recovered. He died in two weeks. During all that time he had to be restrained; he had to be kept in a straight-jacket. I was very glad that this patient was not in his own home. He

could not be taken home. There was no healing of the wound whatever during those two weeks. When we looked at his eye we could see the cornea move about. There was no infection, but the cornea rapidly grew hazy, and the termination was death in two weeks. There is no explanation that I know of for this, except we found out that the man had a daughter who had been in the insane asylum, and probably there was insanity in the family.

Dr. William L. Benedict, Rochester, Minn. I think that we must carefully differentiate between postoperative mania, and what we call cataract delirium. The cases of Dr. Parker, referred to by Dr. Fisher, happened at the University during my period of service with Dr. Parker, and it was my privilege to handle those cases in the hospital. The cases that were reported were cases of cataract delirium; and that did not include all of the cases of mental disturbance or psychosis that developed in the hospital during that time. These cases were carefully studied by the staff in the psychopathic hospital, and they illustrated the necessity of handling differently those cases which were classed as cataract delirium and those which showed mania.

The mania which develops is usually a latent maniac depressive psychosis, with the depressive element subdued and they show the maniac side. The fact was developed that the mania usually started with a sudden awakening and a desire to tear the bandages off. The deliriums begin with low mutterings, and very frequently they will call the nurses and tell them of their hallucinations. Of the cases of depressive insanity which developed during the period in the hospital or in the home, I have seen two occur in the home that did not recover and their symptoms were not improved by removing bandages or uncovering one eye. So that the difference in the reports of so many of these cases is probably due to a lack of discrimination of the type of psychosis.

Dr. R. S. Lamb, Washington. There are two sides to be considered: one is the prevention; the other is the management after it occurs. I do not be-

lieve that it is going to be possible for us to prevent this occurring in some cases. But certainly if we begin at the beginning and make a study of the patient and take the history carefully, the blood pressure, the probability of endarteritis, which includes the cerebral circulation, and also the urine contents of the cases, including microscopic examination; and then refuse absolutely to operate on cases until those conditions which are unfavorable have cleared up, and having in mind at the time that we operate that there is a liability to their recurrence just from the confinement; and then administer our bromides after operation, or chloral or codein, we will surely have very little delirium following operation.

Some years ago, in the practice of one of my colleagues, there was a patient operated on; he had both eyes bandaged, one eye being the seeing eye. There was a little reception held in this hospital, and some refreshments served, and the conversation and the clatter of dishes led the man to believe there was a fire. He rang, but did not get any attention, not having a special nurse—and I want to call attention to the advisability of that wherever it is possible—and he died before twenty-four hours had gone by. That led me to the point of never bandaging the seeing eye. I put a wide bandage snugly fitted to the closed lids, with a gauze put on with the ordinary zinc oxid adhesive plaster, and I have had patients get up and walk around in their dreams without any disturbance of the bandage at all. I have had them handle and fumble more or less with the bandage in their dreams. But the other eye was always open, and it gave them a sense of security, and in that way helped to prevent delirium. Their inability to loosen this bandage when they were dreaming I feel sure in a number of cases has saved the operated eye.

Dr. H. W. Woodruff. I want to make this one suggestion, a compromise measure would be not to put the bandage over both eyes, but just put a strip over the unoperated eye, and tell the patient in case of an emergency, if he feels that he must use that

eye, he can do so, and raise the bandage. In the hospital with the eyes tied up they may think of such a thing as a fire, but if they know that they can raise the dressing it will relieve their mental condition.

Chairman Wiener. Before asking Dr. Fisher to close the discussion, I would like to mention one case which does not seem to fit in with Dr. Fisher's theory of home surroundings preventing this delirium or mania: I recall a patient on whom I operated some years ago whom I was called to see about two o'clock in the morning two days after the operation, and the patient was delirious—had all sorts of hallucinations and ideas—and I removed the dressing from the operated eye—because the other eye was not a seeing eye. The delirium and the hallucinations stopped, and seemingly the patient grew better and entirely well. This patient went home after two weeks, but died a week after she got home.

Dr. Fisher. I would not have the society think for a minute that I am offering anything but an added suggestion for cataract patients. If I have done that much I have accomplished what I started out to do, namely to have a friend of the patient with the patient at the hospital any time and all the time that he is there. I think probably that might eliminate the fire trap that Dr. Woodruff spoke about.

I think Dr. Black is right when he speaks about taking the bandage early off the unoperated eye. I take it off in three days and he takes it off in four. I believe I would just as soon take it off in one as to keep it on for four. I do not see any necessity for keeping it on three, except that it is a habit that I have formed. Possibly the habit could be corrected by taking the bandage off the next day. I think it could, without any trouble at all.

I never heard of Dr. Woodruff's case until now. I know of several cases in Chicago that have not been reported, and of one who jumped out of the sixth-story window of a hospital, after this paper was written, and was found dead.

Dynamics of Extrinsic Ocular Muscles with Suggestions as to Treatment of Muscular Imbalance. (See p. 878.)

DR. JOHN M. BANISTER, of Omaha, read the paper published in full, p. 878.

DISCUSSION. Dr. William H. Crisp. Years ago, when I first read about muscular imbalance, my greatest interest was in the symptoms of the condition. Dr. Banister, in a previous paper, has himself very well summarized these symptoms.

I believe I have encountered every one of these symptoms purely as symptoms of refractive errors without any kind of imbalance of the extrinsic muscles of the eye. I realize how difficult it is to know whether symptoms are due to extrinsic muscular errors or to intrinsic muscular errors. I believe that on every one of our patients we should make a test, or several tests, as regards the balance of the extrinsic ocular muscles; but when we have made that test we have to go on and get our refraction as careful and accurate as we can, and in prescribing the thing to do is usually to ignore the test that has been made with regard to the extrinsic muscles. The information is desirable for future reference; and it may be valuable in a few cases.

The greatest thing we need to learn concerning the extrinsic muscles is, as a rule, to keep our hands off. I think that in every text book on the eye, the chapter that deals with the extrinsic ocular muscles should begin with the warning "Danger, keep off." Some of the worst examples of slipshod work in the correction of refractive errors which we see in our offices, come from optometrists who are cranks on extrinsic muscular defects and who make a hobby of giving patients prisms, muscle exercises, and so on. It is very difficult, as Dr. Banister has himself indicated, to know when we are dealing with normal muscles and when with abnormal. I believe we know very little about what should be the normal balance of these muscles, and the standards which we rely upon are very artificial in their character.

A great many of the patients with muscular imbalance will show perfectly normal ability to turn the eyes in every

direction, and every now and then you will find a patient who has, say, twenty-five centrads of exophoria and yet who with proper refractive correction is absolutely unconscious of that apparently extreme muscular error.

I do not feel that Dr. Banister is right in his statement that moderate exophoria at the reading distance is abnormal. I have not gone into actual statistics in my own cases, but it seems to me that taking the great bulk of those cases which come nearest to being normal in refraction, they will show three, four or five centrads of exophoria at thirteen inches or three diopters from the eye.

I feel that I must also differ from another statement contained in Dr. Banister's paper, which I had the pleasure of reading thru, altho on account of time he has not been able to bring that statement before this meeting, and that is that seven per cent of patients will show hyperphoria. I test for hyperphoria in every patient, and I feel sure that only a very small percentage of them, nothing like seven per cent, show a hyperphoria.

As regards the question of choice between tenotomy and the various forms of advancement or shortening of the opposing muscle, I have had the benefit of experiencing what happened in my own eyes. I used to have a good deal of exophoria, for which a tenotomy of the external rectus was done first on one eye and a year later on the other. Since those operations I have never noticed anything about my own eyes that would lead me to discard tenotomy in favor of advancement where the former is adequate for the purpose in view. The cutting of a muscle, if it will serve your purpose, is very much simpler and very much less trying to the patient. I believe the great lesson of the muscle question is to be more and more careful and still more careful in our refractive measurements.

Dr. R. S. Lamb, Washington, D. C. I want to endorse what Dr. Crisp has said. I appreciate the fact that Dr. Banister is perfectly correct in some cases, but I feel that Dr. Crisp is quite right in bringing out the fact that we frequently have an exophoria.

The other phase which Dr. Crisp touched on is naturally close to my heart. I have repeatedly removed prisms from the refraction prescription of other oculists, and the patient has been made comfortable.

There is a phase that apparently is not being so well considered as it should be, and that is the effect of the general nervous system, especially of the vegetative nervous system on the ocular structures as well as the ocular muscles themselves both the extrinsic and the intrinsic muscles; and that is the question, as to whether the patient is decidedly sympathetictonic or vagotonic. In many of the vagotonics you will get a condition that is exaggerated. In many of the sympathetictonic you will get a divergence, not necessarily one that constantly shows exophoria but one that occasionally shows it. Truly, they are overexcitations of these nervous structures, whether it be leaning on one side or the other.

Now, these cases are correctible by treating the patient's general condition, with the assistance of the tinctur of belladonna or atropin, whether your convergence or divergence is one of vagotonic or sympathetictonic origin. On the other hand, with the sympathetic nervous system nothing has been found by Cannon in his experiments, but nicotin which will depress the sympathetic nervous system. There are thousands of things apparently that will excite it, but only the one, so far as we know, that will depress it. So you will have to put some of your lady friends on cigarettes and your men on cigars, to elicit whether the tendency to very marked exophoria is really due to fatigue and overexcitability of the sympathetic nervous system.

Dr. Edward J. Brown, Minneapolis. I myself am wearing three degrees in all my reading scales. I am sure that they give me great comfort. I first used two degrees, and later I have used three degrees in each scale. I have young people, and several in my own family, who developed a tendency in that direction. I have put them upon prism scales for their near work, with the best results.

I had a patient who came in lately with 28 degrees exophoria, and a con-

vergence near point of thirteen inches. I at once gave her six degrees in each scale, and when she came in a few weeks later the exophoria had gone down to 24 degrees.

One of my boys has been wearing six degrees in each reading correction for some years with great comfort. I have been in the habit of considering anything beyond six or eight degrees of exophoria as pathologic; and for patients from 12 degrees upward of inducing them, if possible, to wear a small prismatic correction. Most of them do it, but occasionally one kicks over the traces, and either I or somebody else has to remove the prisms.

Dr. Melville Black, Denver. When we start out in our careers, I think we have got to know something about the muscles, or to think we do. Personally, as I have grown older, this muscle question has either become so profound that I am unable to grasp it, or my senility is growing so rapidly that it is impossible for me to keep up with it. But it seems to me to be a perfect maze in which I am more or less lost. I wish I knew more about it. I agree with what some gentleman has written in the most lucid and intelligent manner and then I read someone else's discussion of the subject, and the more I read the more tangled I become.

But I venture to say that patients who come to me for refraction are about as well satisfied as the average man's patients. Very few of them are going elsewhere, very few are coming back to me and complaining about unsatisfactory results. After all that is what we are trying to do, we want to give the patients satisfaction; if the patient is relieved and self-satisfied we ought to be fairly well contented.

The point that I am trying to make is: Is the man who is going into this muscle proposition so extensively—so much more extensively than I am—any better pleased with his results than I am? Are his patients any better pleased? If they are, then I am failing to do my entire duty in this matter.

I remember a good many years ago I thought I had to exercise some of these cases; so I exercised them very religiously. I had them come to my

office in order that they might get this exercise under my personal supervision, and then when I sent them my bill they were dissatisfied. I piled up a great big bill, and the patients came back and said, "I am no better than when you started in with this thing." After I did that a few times I began to wonder if I wasn't doing better to go ahead as I had been in the past; and that is about the way the thing finally resolved itself.

There are a few cases, it seems to me, in which attention to muscle balance is worth while; but with the understanding of this subject that I have been able to attain up to the present time, it seems to me there are very few of these muscle cases that need special consideration.

Dr. William F. Callfas, -Omaha. About forty years ago I read some of Dr. Banister's book on operation, and I saw him perform an operation, and I have seen some of his work since, and I think he is a pastmaster at this operation.

Just one thing I want to say in regard to muscular weaknesses: It has been our practice for years to examine sinuses whenever we get weakening of the ocular muscles. In many of these cases we have found an ethmoid trouble. You clear up the ethmoid and in many of the cases the muscular trouble disappears.

Dr. Edward Jackson, Denver. About the time Dr. Banister's paper appeared I was measuring prism abduction and adduction in all cases; and came to about the conclusions outlined in his paper. The prism convergence and divergence are useful, but I do not measure them as a routine portion of the examination.

The apparent balance of the muscles, especially the balance under alternate covering of the eyes, is more important. In many cases prisms should be given cautiously, and the effect tried, on the patient's comfort. Dr. Randall, of Philadelphia, has repeatedly spoken before the American Ophthalmological Society, of the great increase in ability to use his eyes in reading, the relief of his muscular asthenopia, by wearing his correction with a one-degree prism before each

eye. In a majority of cases in which there is an abnormal exophoria—six or eight centrad, the patients are more comfortable for near work if they have prisms. That is my chief use of the prisms, or decentred lenses in place of prisms.

I am not prepared to follow Dr. Banister and Dr. Landolt, in doing away entirely with tenotomy. While the bad effects of ill advised operations have been very great, there are cases that are as much benefited by tenotomy, as by advancement, and the operation is certainly less formidable.

Dr. Banister: Mr. Chairman and Gentlemen. I do not want the members of the Society to think that I am a muscle crank. I believe in treating the general system to try to build up the patient as much as possible; but there are cases where that patient is not going to get well. I told Dr. Black, and I trust that he will try to utilize it, that if he brings a pen point up to a patient, and that patient can not see that point single at a shorter distance than six or eight inches, all the correcting or refracting on earth is not going to make that patient have perfect use of the eyes, because he hasn't enough convergence. I am an urgent advocate of a refraction and trying its correction first before I operate.

I have recently received a letter from a lady in Portland, upon whom ten years ago I operated. She had a little exophoria but she got double vision, and she was a nervous wreck. I operated on this lady ten years ago. She asked me if I could give her the name of anybody in Portland who did that operation, because she hadn't had any symptom of asthenopia since; and she had a friend with the same symptoms who wanted to get some man to do that type of operation.

The principle that we must consider in this is that it is not a weakness of the muscle; it is a weakness of the convergence; and if you can supply from the brain center the proper convergence stimulus to the internal recti muscles, why you are doing the job.

But not having the stimulus to the muscles, what is the best thing to do? To clip the external recti, which are none too strong? Or go on the opposite side and give increased convergence power to

the muscles which are not strong enough. With the same convergence power you can get a greater effect by shortening the muscle to which the innervation is carried. That is the principle. With the given innervation you can get a greater effect from the advanced muscles.

I had one young man that had prism exercises, and other treatment used on the ocular muscles, yet they didn't get strong. He would get diplopia and he was liable to fall out of his machine. These are practical facts and one practical point is worth a good deal of theory. I took the tuck in his internal rectus muscle to get the images in proper position. He went back to the University of Nebraska and carried on his course with impunity, and he has never had any trouble since. If there is anything to relieve him that could have been done, other than giving him proper power on his convergence, I don't know what it is.

Some Optical Imperfections of the Eye and Some of Their Uses.

DR. HENRY SEWALL, of Denver, read the paper upon this subject published in full, p. 865.

DISCUSSION. Dr. Edward Jackson, Denver: One point bearing on Dr. Sewall's paper is the explanation by Dr. Edridge Green, for the yellow coloration of the macula lutea. The remainder of the retina carries bloodvessels which must give a decided yellowish tinge to the light. The macula being free from any circulation of blood requires for its best vision some such tinge to the light; which is afforded by the yellow coloration in the retina at that point. Then a practical point which is worth investigating is the pathologic effects of artificial lights on certain patients, who can not comfortably use their eyes at all by any of the ordinary methods of artificial illumination.

There is no apparent structural difference which accounts for their unpleasant sensitiveness to certain kinds of light, or the pain and discomfort they suffer in an attempt to use the eyes by it.

With reference to the statement of Helmholtz that he would reject such an imperfect optical instrument as the eye if furnished by an optician, there is in it a good evidence of failure to grasp the

breadth of the ocular function. Dr. Sewall has brought out that the image formed by the eye is as good or better by this instrument (that seems optically so imperfect by ordinary standards) than would be formed by the best microscopic objective. Dr. Sewall referred to the wide angle of the field, which is only approached by the best and most elaborate microscopic objectives. In peripheral vision the resolving power is much lower than at the fixation point, the retina lying in front of the focus of the dioptric media. But an imperfectly resolved image probably helps what the peripheral retina is superior in, perception of movement and of slight differences of illumination.

If you will test your own eyes, you will observe that the peripheral retina is quicker to catch movement, is quicker to catch slight differences in amount of illumination than the macula. This can be seen in noticing clouds that are almost uniform in the sky. You can get the most distinct differences in the brightness of a cloud, not if you look right at it, but when you look away from it and get its image on the peripheral retina.

Dr. R. S. Lamb, Washington. We are indebted to Dr. Sewall for bringing out a very important fact, which it seems to me has a definite value in explaining some of the things that we find in practice. For instance, it accounts for fatigue upon exposure to glaring light. We have all noted the red vision which follows such exposure—stimulation and then the taking away of that stimulation and leaving the eye just seeing red. We have looked at the sun or at a headlight and then we couldn't see the road. It also accounts for the fact that we will note fatigue more quickly if we attempt to read by a concentrated light, not relieved by diffused light in the same room. If the patients have been inclined to read late at night by a lamp lighting only the page, the eye has become very much more fatigued than if a diffused light is thrown on the room at the same time.

Dr. William H. Crisp, Denver. In connection with the brief comments that have been made as to the eye seeing better if the light comes from one side, I noticed some years ago that in my office, which faces on the court, during the

darkest part of the day when the general illumination of the room is a good deal less than the rest of the day, I get better results on the test card if I turn on the center lights in my room than if they are off. The visual acuity is greater with the center lights turned on, than if the room is only lighted by what is thrown on the test card. The amount of illumination given to the card by that center light amounts to very little.

I was sorry that Dr. Sewall did not discuss the question of how far our psychology accounts for delight in green. The fact that our animal ancestors and our human ancestors for perhaps a million years, on account of their not always having food or shelter, and not having the warmth that comes with summer and the green that accompanies it, found such delight in green, that there might be sufficient reason for the present preference for green, perhaps over any other color.

Clearing of Vision in Unoperated Cataract:

Dr. E. N. Robertson, Concordia, Kans., read the paper published in full in the November issue, p. 820.

Tonometry and the Prevention of Glaucoma:

Dr. Edward J. Brown, Minneapolis, Minn., read the paper published in the September number, p. 669.

DISCUSSION: Dr. James A. Patterson (Colorado Springs) being absent Dr. William H. Crisp (Denver) read for Dr. Patterson, as follows:

Dr. Brown states that the readings from his tonometer will be almost as dependable as the measurement of a board with a carpenter's rule, provided the tonometer is held sufficiently long to secure an accurate minimum. Now, we know, in order to obtain accurate readings, that the tonometer must not rest on the cornea too long, nor must it be applied again excepting at a considerable interval. I therefore feel that no instrument, to obtain accurate results, should be kept in situ more than a few seconds.

The most instructive part of Dr. Brown's paper is the fact that his clinical cases show that where there is undue eyestrain, there is an increase of tension; showing that there is more or less disturbance in the uveal tract, which

apparently disturbs the regular ratio of the interchange of fluids, so essential for the prevention of glaucoma and for the proper nutrition and full function of the eye. This deduction is made assuming these tonometric readings were made before any cycloplegic was used. As the text does not mention these facts my opinion must be based on these surmises. Of course, if the tonometer findings were had after a cycloplegic they would be considered normal.

I disagree with Dr. Brown's statement "that simple chronic glaucoma is a practically universal condition." By palpation we may reduce the tension in those eyes that are functionally disturbed and have a functional hypertension. Placing the fingers on the eye you get a certain sensation of hardness that conveys an impression to your mind depending entirely upon how much experience you have had in using the method. I use it on every patient that comes into the office, man, woman or child. I have done it for years, and I get information on which eye is probably worse. Even in refractive errors, with eyestrain, I get the impression of which is the bad eye.

If you palpate an eye that has apparently an increased tension, wait a moment or two and then take the tension again with the fingers, you will note that the tension has gone down in those cases in which the eye has a functional hypertension. I think that some of those that Dr. Brown speaks of are only functional, and that is why he finds them more or less universal. The individual may have a tension after lunch or after dinner, and not later on. That kind of tension occurs in individuals who do close ocular work, but it is only a functional hypertension, which, as soon as the relationship in the ordinary flow of fluids is restored by exercise or for some other reason, comes back to normal. The other cases, however, in which there is more or less permanency, and in which there is probably a simple chronic glaucoma, will remain hard, even after palpation. I think this is a method that is neglected to too great an extent nowadays. We had, of course, to depend on it at one time entirely for our knowledge of tension.

Dr. Edward Jackson. The basis of our knowledge of increased tension must

be some conception of normal tension, and I believe that our conceptions as to normal tension of the eyeball are still to be modified and greatly improved. One writer on glaucoma has recently taken the stand that there is probably a fixed normal tension of the eyeball, and any variation from it, even slight variations, of, say, more than five millimeters, must be regarded as abnormal.

I believe that the limits of normal tension are wider apart than has generally been accepted—more than ten millimeters. The limits of variation of tension that do not constitute glaucoma, but are liable to occur under temporary perturbations of the eye, or the general system, are much wider than that. The nearest analogy we have to ocular tension is blood pressure, and we are just beginning to learn, after many thousands of observations that we can have great variations in blood pressure, which have little or no pathologic significance. Or if they have pathologic significance it is such as we do not yet understand.

For instance, a physician known to many of you has had a blood pressure running well over two hundred mm. of mercury for some years, and is apparently still in good health. We see patients whose systolic pressure runs up to two hundred millimeters, who seem to be in health and have continued in health for years.

The number of cases in which intra-ocular tension of over 30. mm. of mercury has been noticed is quite large. Some of them are very clearly a temporary ocular condition; others are probably connected with temporary conditions of blood pressure. Those patients return to normal and continue normal.

I had a patient alarm herself, because her mother was suffering from glaucoma, and her stepfather had suffered from a traumatic glaucoma, and they knew in that family the terrible nature of the disease. She had an intra-ocular pressure of 32 to 35 mm. by the Gradle and also by the Schiötz tonometer—I think I never found it below thirty millimeters. She continued thus for years, and her eye is still normal, with normal vision. After she was convinced that she was not on the brink of

an outbreak of glaucoma she became free from her subjective symptoms.

We have encountered enough of these cases to know that they exist; and before we assert that any particular degree of tension indicates glaucoma we must know more about the cases in which the same degree of tension does not indicate glaucoma.

To go back to blood pressure: The rise of blood pressure depends on two factors, on the force of the heart and the resistance in the peripheral circulation. To overcome a peripheral resistance, that does not represent some distinct pathologic process may not be dangerous or particularly damaging to the patient. On the other hand, patients have gone thru very long lives apparently with low blood pressure. I saw one within a week whose blood pressure runs from 100 to 120 mm., a man of eighty years. I know of another one still older whose blood pressure of late years has never been over 120 mm.

The blood pressure is to accomplish a certain result; it is to furnish against different obstacles the necessary circulation. In the eye, I believe, that the intraocular tension is to accomplish a certain result, with the resistance varying at different times, a different tension must be maintained in order to keep that eye in a state of health.

We do not know very much about intraocular tension yet; and we must extend our observations more widely, and must have more of them under circumstances quite apart from clinical glaucoma. But to say that a certain tension as registered on Brown's instrument, or any instrument, shows a case of simple glaucoma, is simply a modification of language. Glaucoma stands in our minds a clinical entity; and unless these cases go thru the course that is represented by the term "simple glaucoma," it is a misuse of the term to call them such.

Dr. William H. Crisp, Denver. We have an interesting parallel between the measurement of blood pressure with the manometer and the clinical relations, on the one hand, and the measurement of the intraocular tension with the tonometer on the other. We may see patients with a blood pressure considerably over 200, who apparently are in a condition of rel-

atively good health for a number of years and who show no marks of breakdown of any of the blood vessels. On the other hand, we may see patients with a blood pressure of 120 who show marked manifestations of vascular breakdown, who may have vascular lesions in the eye which are responsible for destruction of vision.

Coming to the tonometer, we have cases that show rather above the average tension without marked clinical disturbance. We have patients who show an intraocular tension well within the average normal limit who have what we call simple glaucoma. There is a relation about the matter that needs a good deal more analysis than we have given, before we take measurement with the manometer or with the ocular tonometer as showing glaucoma present or absent. I do not believe that Dr. Brown's paper condemns all the tonometers, including the various modifications of the Schiötz, which we have used. I feel that we can go on to use our old tonometers for information to some extent. Because after all what we need mostly to get with the tonometer is a comparison between one eye and another, not necessarily to know that we have the absolute measurement; and the Schiötz and Gradle tonometers give a fair comparison between different eyes and the same eye at different times.

Dr. Melville Black, Denver. In looking at this instrument I am impressed with the fact that I have a good deal of trouble seeing the scale, and I am just wondering if we can see it. I also wonder if this is a permanent instrument, or whether the doctor is in the act of perfecting it. We should have a scale that we could see more readily. It would seem to me very difficult to see that scale accurately enough, while I was holding this instrument upon the cornea, to be able to read it readily. If those numbers were marked in black or with larger numbers, it would seem to me to facilitate the handling of the instrument.

Dr. Edward J. Brown. Dr. Black's criticisms are entirely just. That instrument is the only one I had made aside from the one I made myself out of the piece of brass or copper, with a little assistance from a mechanic, which cost me

a dollar and a quarter, I believe. This instrument was made not by an instrument man, but by a machinist, and I have not been able as yet to get another instrument made. I have three others in the same shop which I hope I can have finished up in better shape. All these criticisms are just, it is a difficult instrument to read. I got the thing finished up as it is to the best of my ability, with the best material at hand.

I recognize the justice of all these criticisms. Beginning with Dr. Patterson's question: I hold the instrument on the cornea for just long enough to get a definite reading, and if the reading is suspiciously high, I repeat it, but after I have taken the reading from the other eye. It is true that I find sometimes that my second reading is lower than the first.

Gradle says that three or four minutes massage of the eyeball will reduce the tension three degrees. It is possible that the amount of pressure from that instrument, which here is about two ounces, will reduce the tension enough so that there will be a noticeable difference. But I try to use the instrument with skill and with common sense.

Most of my measurements have been made without the use of a mydriatic. Some were made before and some after.

Dr. Crisp questions whether I condemn other tonometers. I think that my instrument is a more practical and a more convenient instrument than the others and more truthful in regard to intraocular pressure. I believe with Dr. Crisp that the other instruments, if used carefully and skillfully, will give comparative readings which, perhaps, are the important thing, or they would have to be thrown upon the junk pile.

Value of Dental Examination in Ocular Disorders.

(DR. WILLIAM L. BENEDICT read the paper published in full on p. 860.)

DISCUSSION. Dr. William C. Finnoff, Denver. The reading of a paper on focal infection at this time calls for about as much discussion as the reading of a paper on cataract. I think that ophthalmologists realize the importance of focal infection, especially about the teeth, in the production of certain inflammatory and reflex conditions of the eye. The manner in which this takes place has not

been clear, but Dr. Benedict has classified the modus or spread of infection.

Formerly it was thought that infection passed from the teeth along the bony canals and along the periosteum thru the lymph vessels and thru the blood vessels to the eye. Infections of the orbit, lids and conjunctiva could pass very readily along the periosteum and to these structures; but an intraocular infection must necessarily be of hemotogenous origin, organisms passing from the primary focus to the secondary focus thru the blood.

In certain focal infections the removal of one particular focus does not necessarily clear up the secondarily inflamed area that happens to be in the eye. With modified secondary changes, with abscess formation or with breaking down of tissues in the eye, a removal of the primary focus will not remove the organisms that are producing this particular infection. The suggestion of treating those eyes with autogenous vaccines after the teeth have been removed, I think is very valuable.

I do not think that we all realize the necessity of obtaining X-ray pictures of all the teeth where focal infection is suspected. A great many of us are inclined to take the dentist's word when the reports show negatively on the teeth. I think we should always insist on X-rays of the teeth to determine whether root abscesses are present or not.

Another point that I think is not generally understood by ophthalmologists, in determining whether focal infections of the eye are due to the teeth or not, is about the taking of cultures. There are a great many men who believe that the finding of streptococci in pyorrhea pockets or abscessed roots positively demonstrates that that particular area from which the streptococci were obtained is the area which was producing the infection. The mere finding of streptococci proves nothing. In order to prove that the lesion is produced by this particular area it is necessary to make cultures according to the technic of Rosenow. Simply making these cultures on blood serum does not prove anything; but according to Rosenow's technic and then obtaining the lesions in the animal, certainly proves conclusively the particular area from which the infection was derived. I am a firm believer in the selective action of these streptococci.

Dr. Black. Mr. Chairman, personally I can not agree with the doctor with regard to prophylaxis previous to cataract extraction. I have come to believe that I do not wish to operate for cataract until the mouth of that individual has been placed in a proper hygienic condition, and most all of these old people who come for cataract extraction, if they have any teeth left, are certainly open to a great deal of suspicion. With the many years of dental knowledge to save teeth, when a man has reached sixty or seventy, those teeth remaining, many of them will be found to be dead; and all such teeth, at that age particularly, are certainly open to suspicion.

Furthermore, pyorrhea, a septic condition unquestionably of the mouth, is very closely adjacent to the eye. Granted, even, there may not be in this particular case a lymph stream or a blood stream, or any other sort of direct communication. Such septic condition so close to the eye, in my opinion, should be considered in a different manner from one that is not septic, at least in that way. It is my practice in all cases of cataract to postpone the operation until the mouth of that individual has been placed in a hygienic condition.

Dr. John O. McReynolds, Dallas, Texas. I would like to emphasize the position taken by Dr. Black. I believe that I have made several mistakes in the past in not having assistance on the proper preparation of the mouth before operating both for glaucoma and cataract. I recall a number of cases, for instance, that had glaucoma in both eyes, in which I would operate on one eye and succeed in avoiding an operation for glaucoma on the other eye. Simply by attention to the teeth the necessity for the operation for glaucoma had passed away. Then I have seen cases of chronic iritis, in which there was adhesion of the iris to the lens; even after they had been infected for ten years, would yield to nothing until the dental infection was removed. Given this fact, that these diseased teeth will have a distinct influence in the production of glaucoma and in the production of iritis; we ought to place our patient in such a position that there will not be the slightest possible tendency toward the development of

uveitis, or the development of glaucoma, after an intraocular operation.

I feel quite convinced that in the future I would be doing a great service to my patient in making him more comfortable in every way, if I should insist on a perfect condition of the teeth, before I should agree to an intraocular operation.

Dr. R. S. Lamb, Washington. The question arises whether the other methods in vogue in the Mayo clinic are not an offset to the complications that might arise, and would arise probably in the practice of most of us not so fortunately situated. Personally, I refuse to operate on a cataract case until the mouth has been reported by the dentist as surgically clean from his viewpoint. If it requires the removal of all the teeth, it is a small sum to pay for keeping an eye following an operation.

We, all of us, had some years ago cataract extractions which gave us immense difficulty with subsequent iridocyclitis. The operation was perfectly clean; there was no reason to expect that immediately following the operation any complication such as that would arise. Now, we know in many of those cases it was the teeth, and it is not necessarily the pyorrhea, as generally spoken of, where we have a very definite discharge.

Stengel, in an article some time ago, confirmed this. There was an absolutely negative report from the dentist, in a case of iritis which he was trying to work out, associated with chronic albuminuria. The X-rays were perfect, there was no pyorrhea; but there must have been absorption from the colon sufficient to account for the albuminuria because with the removal of the teeth and the thorough cleansing of the mouth, the albumin disappeared from the urine for the first time in some years. Those of you who know Stengel, know that he is a thoroughly capable man.

I feel as tho I wanted to emphasize what Dr. Black and Dr. McReynolds had to say, that it seems very essential that we keep in mind that our practice differs somewhat according to the locality, the condition, environment and everything considered; and we have got to think of the patient and his welfare first before the reputation of the physician or anything else.

Dr. W. A. Fisher, Chicago: To be on the popular side, I should agree with the last three speakers and condemn Dr. Benedict's stand; but it is impossible; I couldn't do that. I do not recall ever having an infected eye that I could trace to a bad tooth. In 600 operations that I was permitted to do in India, there were three infections. I reported those cases. They are the dirtiest people, probably, on earth; they have no dentistry; ninety per cent of them have trachoma; and I really think that the teeth have been *overdrawn* just a little.

Dr. McReynolds. May I ask, Doctor, if you would operate in this country on a patient with trachoma, for cataract?

Dr. Fisher. I have. Yes, I should operate on a patient in this country with trachoma, because I couldn't cure it anyway. I would never operate, if I didn't.

Dr. Benedict. I heartily agree with Dr. McReynolds and Dr. Black and also with Dr. Fisher. I too have operated on a patient with trachoma for cataract. The reason I injected it into this paper was thru a question that was asked me at the Hot Springs meeting by old Chief Dr. Parker. He says, "We all agree that the mouth should be cleaned up before a cataract operation. In your opinion, how long should we wait after the mouth has been cleaned up before we should proceed with the operation?" I hesitatingly but reverently told him that I disagreed with his first statement. I had no post-operative complications that I traced to the eye; that was the main basis for it.

The other is this: we know that extraction of teeth alone does not remove the disease of the bone, nor does it remove the danger from pus, which is probably disturbed by the extraction of the teeth with forceps.

We have very frequently seen cases where the teeth have been removed without leaving symptoms. Now, when successful in that way we can pick out with the forceps a small pus sac, that is just as definite as a polyp to be taken from the nose. But when that sac is destroyed by the ordinary tooth extraction that pus is partly absorbed, and in absorbing the pus we also absorb the organisms, and the organisms going thru the blood stream are deposited in other tissues, as

you saw in the picture in the attachments of the muscles to this rib. This sets up secondary foci infection, which may last as long as the original would last in a tooth which had been unmolested.

Unless extraction of the tooth is done surgically clean; unless all of these things are removed so that you do not set up secondary foci, you have opened up another avenue of infection. Is the barrier that the person's body presents to the infection dependent upon the amount of toxins that are eliminated from this focus in the blood stream? You can overcome that by injecting large quantities of organisms, or you can strengthen the barrier by the use of properly moderated toxins, which were described as vaccines.

I agree with the doctors perfectly that it would be all right to remove all of the primary foci, and immediately combat the secondary foci by the use of vaccines, but where is the end? This patient has put up a barrier against these diseases; which he has found adequate for a number of years. We know that these diseases can go for a number of years, and he has never had any eye trouble from it. His eye is not going to have a great amount of reaction unless postoperative inflammation of the eye is set up. Then it may be increased, and that is where this focus comes in. Iritis may continue for a long time, but if in addition to that we have toxins from some septic focus, it will last an indefinite length of time.

If we carefully check all of our dental examinations with the culture experiments as well as we can; and it must be done with the method of Rosenow, or some similar method, it still holds we are starting a process that may prove very bad. We are never sure when we are pulling these teeth and stirring up a focus, that we are not going to do more harm than good. So that if a thing is getting along fairly well and has been for a number of years, unless we do too much damage to the eye at the time of operation, that eye is going to carry thru the intraocular operation. I don't know the number of them, but we have had a sufficient number of such eyes and we never have had a single inflammatory complication that can be traced to a dental infection.

(To be continued.)

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INSANITY AFTER CATARACT EXTRACTION.

The discussion on delirium and insanity following cataract and other operations on the eye, illustrates the peculiar value of the discussion of such a subject in a medical meeting. The paper, bringing clearly to mind what has been the common experience regarding this condition in the past, is a necessary start. But the peculiarly valuable thing about a medical discussion is the variety of points of view, which come out as different men give the results of their own observations and experiences. In this way a more complete picture of the condition under discussion results than it is possible to get in any other way.

The danger of delirium, or more permanent insanity arising to complicate the after treatment of cataract extraction, is sufficiently great to demand careful attention from every surgeon who operates for senile cataract. The whole list of acquired insanities are associated with deteriorations in nutritive processes, that are closely akin to

the lowered grade of vital activity that comes on with age. The obscure nutritive failure that produces senile cataract, is closely allied to the obscure nutritive deterioration that predisposes to insanity. One may suspect that such a predisposition may be lurking in a large proportion of patients suffering from senile cataract.

From modern laboratories of psychology have come many of the recent important contributions to our knowledge of physiologic optics. Psychology begins to realize that its processes are founded upon and deal primarily with sense impressions. Modern psychiatry recognizes that delusions are likely to be built up from sense hallucinations. Change of accustomed sense conditions tends toward mental instability. Fixed worry over an impending misfortune—advancing blindness, with uncertainty of relief, and disturbance of eliminating from diminished exercise entailed by poor sight, all contribute to the dangerous predisposition.

For exciting causes we have the emotional perturbation of the crisis in

strong hopes and fears, that have come to occupy a large part in the subjective life of the patient; the risks of submitting to an extremely delicate and important operation, in full consciousness, but without seeing what is going on; the tendency to accumulation of toxic substances in the body, incident to enforced rest in bed, all bear upon a patient cut off from sight and subjected to unfamiliar sounds. Crile and Lower have shown that the changes produced in the central nervous system are the same in surgical mutilation, shock, intense fear and extreme exhaustion. In the patient subjected to operation for senile cataract we have also the lowered power of resistance and recovery of age. That some of our patients will succumb to this combination of adverse influences is certain.

It is therefore the duty of one who advises and performs the extraction of senile cataract to guard in every way possible against the danger of delirium or insanity following the operation; just as it is his duty to guard against displacement of the flap or infection of the wound. He should study the patient and his surroundings with reference to mental condition and environment, as he would look for signs of arteriosclerosis or albuminuria. He should plan to guard the patient against danger of diminished elimination, unnecessary shock, avoidable change of environment, excessive excitement or anxiety about the result, with the same care that he exercises in planning the steps of the operative procedure.

The subject is one of great practical importance, which only becomes manifest when we bring our individual experiences and add them to the common stock of knowledge, and seek to apply all the available methods to avoid this danger. It is one that has been recognized for more than 100 years. What has been learned of mental disease since the days of Rush and Pinel has expanded the subject, until it is one of the most important; to be broadly comprehended by the ophthalmologist who undertakes to extract senile cataract.

E. J.

RIGHT TO COLLECT FOR SERVICES

A decision of great importance to physicians has been rendered by the Supreme Court of Wisconsin in the case of Noer vs. G. W. Jones Lumber Co. Briefly stated, the plaintiff was called in to attend an employee of the company; but when his bill was rendered the company claimed that the amount was excessive and requested that the matter be referred to the industrial commission for adjustment. The plaintiff refused and sued for the amount of the bill. The court held that the provisions of the workmen's compensation act were binding on employers and employees electing to be bound by them; but all others are strangers to the act and their usual lawful rights and remedies are unaffected by it. The act does not provide that the physician rendering the aid, which the employer is obligated to provide, must submit the reasonableness of his fee to the industrial commission.

Oculists, as well as other members of the medical profession, are frequently confronted with the condition that when they have rendered services to an employee at the request of an employer, and have presented a bill commensurate with the value of the service rendered, they are referred for its payment to an insurance company, whose contract with the employer contains a fixed scale of compensation for services rendered to employees. This compensation was never agreed to by the oculist, but he must accept the amount or go thru a course of letter writing and even at times must sue for the amount of his bill.

It would seem from the above decision that a logical extension would be that the physician is in no way bound by a contract between an employer and an insurance company, to which he is not a party, and a test case would probably result in holding the employer for the full amount of the bill. It certainly would do away with the unpleasant necessity of correspondence to determine the party responsible for the payment of the bill.

C. L.

THE ACADEMY MEETING

It was at Kansas City, April 9, 1896, that the Western Ophthalmic and Oto-Laryngologic Association was organized. Seven years later its name was changed to American Academy of Ophthalmology and Oto-Laryngology, and it underwent a general reorganization. October 14-16 it held its twenty-fifth annual meeting in Kansas City, and demonstrated more clearly than ever that it is one of the most important special medical societies in America, and a leading progressive organization aiding in the advancement of science.

Altho its dues were doubled last year to provide a fund to assist scientific research, the Treasurer's report showed no falling off of membership. Of over 1,100, nearly 300 were in attendance, while the applicants admitted at this meeting numbered 234. The scientific program was up to its usual high standard. Some of the papers read before the meeting will appear in later issues of this Journal. But the meeting was most notable for the new features that attended it, or were projected by it for the future.

The American Board for Ophthalmic Examinations held its examinations for the first time in connection with the Academy meeting, and the first time west of the Mississippi River. Over forty candidates were awarded the certificate of the Board, beside those whose applications were held over for future action, and others that were rejected. These examinations were held at the Medical Department of the University of Kansas, under the most favorable conditions that the examiners have enjoyed in the five years they have been carrying on such examinations.

On the day preceding the meeting, also at the Medical Department of the University of Kansas, there was arranged by a committee of the Academy a demonstration of slides showing the normal and pathologic anatomy and histology of the eye. These were shown under more than 40 microscopes, furnished by the above named institution, and each was accompanied

by a typewritten slip calling attention to the notable features of the specimen. The slips were supplemented by verbal explanations by Dr. William C. Finnoff, who had prepared the exhibit. These slides were seen by about 20 members of the Academy. But others, who heard of it later, regretted having missed the opportunity, and the possibilities of such demonstrations so impressed the meeting that on recommendation of the council it was resolved to devote three days to such "graduate teaching," in connection with the next meeting of the Academy. In moving for such action Dr. Greenwood pointed out that the Academy was just entering upon a most important function implied in its name.

As previously determined, the Academy, like the American Ophthalmological Society, will hereafter require the certificate of the American Board for Ophthalmic Examinations of ophthalmologists applying for membership. It was evident that this would create an anomalous condition if oto-laryngologists, or those practicing both specialties, could still be admitted without passing any such examination. For years the creation of such a board to examine in oto-laryngology has been discussed, and agreed to in a general way, but not carried out. At this meeting the Academy broke the deadlock by creating its own board of six, to examine in oto-laryngology until such time as a National Board should be established by cooperative action of all national organizations interested in this subject. We believe the formation of such a National Board will speedily follow, and the requiring of those who claim special knowledge or skill in any branch to demonstrate it will become common.

The committee on investigation of the Etiology of Iritis, composed of Wm. C. Finnoff of Denver, John Green, Jr., of St. Louis, and W. L. Benedict of Rochester, Minn., reported that they had accumulated 80 cases furnished for the purpose, but that several hundred cases should be brought together, and that these cases should be carefully studied by laboratory methods to

make their work most valuable. They asked the further co-operation of Fellows of the Academy in this undertaking, and that of ophthalmologists outside of the Academy will be equally welcome. One or two well-studied cases are worth more in this connection than any number of cases in which the etiology has been guessed at.

The officers of the Academy for the coming year are: President, Emil Mayer of New York City; Vice Presidents, First, John R. Newcomb of Indianapolis; Second, R. F. Ridpath of Philadelphia; Third, William C. Finnof of Denver; Secretary, Luther C. Peter of Philadelphia; Treasurer, Second H. Large of Cleveland; Editor, Clarence Loeb of Chicago; Councilors, Horace Newhart of Minneapolis and E. C. Ellett of Memphis. The committee in charge of the graduate teaching is Harry S. Gradle of Chicago, W. P. Wherry of Omaha, and Meyer Weiner of St. Louis. The next meeting is to be held in Philadelphia, the exact date to be fixed after consultation with the Fellows of that city.

E. J.

THE JOURNAL YEAR

We have no desire to dwell upon the difficulties this JOURNAL has to meet and overcome in common with other journals, scientific and literary, in order to keep up its standards and continue publication. But an occasional frank statement regarding the situation seems due to our subscribers and contributors, who are really partners in the enterprise.

During the past year we have had to meet two increases in cost of printing in all its departments, which amounted in the aggregate of 21 per cent over the very high prices prevailing at the beginning of the year. The present contracts between the printing firms and the unions terminate in February, and if those who dominate the unions believe the state of the labor market makes it possible, there will doubtless be another increase at that time. It is impossible to get paper except by ordering months in advance,

and then paying the price prevailing when it is delivered. Up to the present time this price has been moving upward.

Under these circumstances it has only been possible to continue the AMERICAN JOURNAL OF OPHTHALMOLOGY and OPHTHALMIC LITERATURE at their present level, by the cooperation of larger lists of subscribers than have ever before joined to sustain an ophthalmic journal. The continuance of this cooperation and support, in the prompt payment of their own subscriptions and in speaking of the publications to others (more than half the oculists of America still take no ophthalmic journal) will make it possible to continue our publication as we desire in spite of the adverse conditions.

During the past year, by publishing 12 numbers in 11 months, we have succeeded in bringing the date of publication to the first of each month, altho inadequate mail service has often delayed the delivery, and the mails seem particularly overburdened near the close of the political campaign.

Failure to pay promptly and keep the names on the regular subscription list is always a cause of increased expense and greatly increased labor for our office force. To all who will save us this expense we are glad to give something in return. We, therefore, will send to all subscribers, new or old, who pay before January 1, 1921, copies of one of the unlearnable test figures alluded to in our November issue, page 843. Additional time will be allowed for those who live outside of the United States. This is not a premium for subscribing; it is a premium for prompt payment.

The policy of the JOURNAL will not be changed with reference to its associated publication, OPHTHALMIC LITERATURE with its Yearbook Digest of the literature of ophthalmology, with classified bibliographies. In this way our readers are given command of the literature of the world relating to ophthalmology, carefully classified, sifted and condensed. To meet the requirement of the post office department regarding such publications, a separate price has to be set upon

each. But the price for the two will not be increased over that paid when they were issued together.

THE OPHTHALMIC PUBLISHING CO.

BOOK NOTICES

Ophthalmic Operations, edited by **Harold Grimsdale, M. B., F. R. C. S., and Elmore Brewerton, F. R. C. S.**, 438 pages with index. London, Bailliere, Tindall & Cox. Price, 18 shillings. 179 illustrations.

This is the second edition of this textbooks, the first having proved a reliable guide to the operator.

Not all operations, by any means have been considered by the authors and the choice will not appeal to every one; in fact, altho the book covers 438 pages, it is really a description of "some operations." These are succinctly described and are accompanied by diagrammatic illustrations, which aid the understanding. For operations on the lids, the descriptions given are perhaps sufficient, but for intraocular operations, even those on cataract and glaucoma, the descriptions are not quite those of the operations that may be commonly seen in America, i. e., the technic is somewhat different. Other operations, such as those on the cornea, muscles and foreign bodies in the eye, should have merited more exhaustive descriptions. The book is recommended as a reliable guide for the surgeon.

H. V. W.

Travaux Neurologiques de Guerre, Preface du Professeur **Pierre Marie**, by **Georges Guillain** and **J. A. Barre**. 463 pages with index and paper cover. Masson et Cie, Paris. Price, 18 francs.

This work on the Neurology of the Eye is an admirable exposé of work done during the war, being a collection of separate essays, part of which were published during that time in various French journals, describing injuries to the brain, spinal cord, their membranous and osseous covering and the peripheral nerves, organic lesions produced by action from a distance of explosions, commotions, etc.

The grouping of the work is original, especially that under Semiology of the Nerves, where the various reflexes are exhaustively studied, particularly the medio-plantar, tibio-femoral posterior and peroneo-femoral, which enrich the technic of examination and render clinicians a real service. In particular, the description of a large number of cases of complete section of the spinal cord is of interest. The first three chapters are taken up by semiology, particularly of the reflexes; the second part by injuries of the encephalon; the third with those of the spinal cord; the fourth with commotions of the brain and cord without external injury; the fifth with pathology of the cranial and spinal nerves, and the sixth with five separate essays.

It goes without saying that the structure of the eye and its nerves have been affected in a large proportion of the instances and cases cited in this book, and herein is the direct interest to the oculist, as these ocular conditions are cited in detail and accompanied by a number of illustrations. This is a work that marks an advance not only in the history of injuries, but as well in the technic of examination.

H. V. W.

Report of Transactions Heidelberg Ophthalmological Congress, Fortieth meeting, 1916. 536 pp. 110 illustrations. Compiled by **A. Wagenmann**, Secretary, Wiesbaden, **J. F. Bergmann**.

German publications are beginning to come to us thru regular trade channels. In this way we now have the above transactions, four years after the holding of the meeting therein reported. This fortieth meeting was held 53 years after the founding of the Society, more than three years having elapsed since the thirty-ninth meeting in May, 1913. The meeting was held in the midst of war which had been going on for two years, and was occupied chiefly by war ophthalmology.

There are papers and discussions on: The visual tracts and centers and their various injuries encountered from war wounds. The ophthalmoscopy of in-

juries of the skull, traumatic impairments of ocular movements and foreign bodies in the eye are leading topics. The treatment of ocular wounds, sympathetic disease and protheses, all come in for consideration. Hemeralopia, general ophthalmic practice in field service, the dazzling of aviators, refraction and protective glasses in military service, and conditions of psychogenic origin are all taken up.

A minority of papers refer to parts of ophthalmology not especially connected with military activities. Altogether 53 papers are included in the volume, 20 of which are accompanied by reports of more or less discussion. The remarks of Professor Leber in opening the Congress refer to the absence of foreign members on this occasion. The names of these, from countries with which Germany was then at war, are carried on the list of over 700 members. The list of deaths since the last meeting in 1913 includes 34 names and should include that of Dr. Hasket Derby of Boston, who died in 1914. The resignations number 14, and 37 new members were elected at this meeting. The absence of colored plates in this volume contrasts sharply with the number published in its immediate predecessor.

E. J.

Atlas of War Ophthalmology. A. von Szily. Collection of the war ophthalmological observations and experiences at the eye clinic of the University of Freiberg i. Br. With a preface by Prof. T. Axenfeld. 589 pp. with 511 illustrations and 77 plates, 65 of which are colored. Ferdinand Enke, Stuttgart, 1918. (See also A. J. O. v. 3, p. 365.)

This magnificent atlas with its interesting and valuable text will be heartily welcomed as a lasting scientific monument from the great war. On account of the geographic location of Freiberg, large numbers of recently wounded eye patients were sent without loss of time directly from the battlefields, right from the beginning of the hostilities in 1914, and also later after they had been for more or less longer periods in more distant hospitals. Thus the author was

enabled to see an abundance of eye injuries from the moving armies and from the war in the trenches.

All important conditions were photographed, skiagraphed with Roentgen rays, the ophthalmoscopic changes studied with the large ophthalmoscope of Gullstrand, and reproduced in four color prints, and the anatomic and historical findings of some cases, observed during life, carefully described and illustrated. The injuries of this war show, in consequence of the modern methods of fighting, certain peculiarities, which are compared with those from former wars, and the literature is extensively utilized, with bibliographies after each chapter.

The first part contains the chapters on injuries of the skull and eyes, orbital-temporal lesions, war hemianopsias, injuries of the orbit and its surroundings with remaining projectiles, lesions by projectiles of greater destroying force.

For the interpretation of the ophthalmoscopic image and the indications as to operative procedure, the exact distinction of choked disc and optic neuritis is advocated. As to the degree of prominence, attention must be paid in the first place to inflammatory changes of the disc, which in cases of optic neuritis with slight swelling are in the foreground. Complications which lead to these inflammatory changes are much more frequent in injuries of the skull than is spontaneous choked disc in tumors of the brain. Choked disc and optic neuritis in injuries of the skull are important symptoms of complications; increased pressure, bone fragments, foreign bodies, meningitis, encephalitis, etc.

This symptom may be present even if the general condition of the patient is good and without his complaining of his eyes. It deserves the greatest attention, and if the first examination is negative it is urgently necessary to control cases of injuries of the skull from time to time with the ophthalmoscope. The occurrence or recurrence of optic neuritis or choked disc in the course of treatment always is a threatening sign, as well as the aggravation

of the condition found at the first examination, and justifies a radical revision of the wound by the surgeon. If there is a difference between the right and left eyes, the swelling of the disc is, in four-fifths of the cases, greater on the side of the injury.

The author does not venture to decide with absolute certainty whether the diagnosis of choked disc or optic neuritis should be a signal for immediate operation. He quotes instances of the favorable effect of immediate operation and also those in which waiting for more significant general cerebral phenomena, at least in the majority, was not detrimental to the patient. On plate 1 excellent pictures illustrate choked disc in cerebral abscess after occipital injury: (1) at the first appearance of cerebral symptoms almost two months later; (2) increase of congestion; (3) regression of choked disc after successful operation.

The very interesting chapter on hemianopsias deals with quadrant hemianopsias and hemiamblyopias, color, homonymous, bilateral inferior hemianopsias, hemianopic scotomas; with photographs, Roentgen skiagraphs and visual fields. From these and the present knowledge gained also during peace, it appears that the visual center is not limited to the calcarine fissure and its lips, but probably extends to the lower part of the cuneus and ventrally to the gyrus lingualis, perhaps behind to the gyrus fusiformis.

The following chapters discuss and illustrate metastatic ophthalmia after-war injuries, penetrating shots with an exit, with splendid ophthalmoscopic and histologic pictures of the accompanying chorioretinitis proliferans and atrophica, bilateral injuries, war blindness and the care of the blind, perforating injuries, intraocular foreign bodies, which the author believes represent half of all ocular injuries and infec-

tions. Eyes with projectiles in the interior are mostly lost.

On account of early preventive enucleation sympathetic ophthalmia was rare. The author found only in one out of 80 eyeballs examined by him in serial sections changes suspicious of exciting inflammation. If the eyeball is completely destroyed, the contents of the orbit must be carefully searched for remnants of uvea, which, according to Stock, may show chronic inflammation identical with that of the exciting eye in sympathetic ophthalmia.

Ophthalmoscopically visible foreign bodies were rare, on account of the severe lesions of the ocular tunics by the kinetic energy of the modern projectiles, which prevented a view into the depth. Even after successful extraction of copper and brass and pieces of grenades, about 50 per cent of the eyes were lost thru later complications.

Very interesting are the pictures of hemorrhagic infiltration of the cornea in hemophthalmus. The 11th chapter gives a discussion on the changes of the macula due to lesions chiefly of the choroid and isolated lesions of the retina, e g., the formation of holes in the macula, with many instructive ophthalmoscopic and anatomic pictures. The question of the existence of a post-traumatic primary glaucoma is, according to the experiences in the war, answered in the negative.

Then follow chapters on gas diseases, injuries and burns by gas grenades, bombs, etc., organic lesions of motility and sensibility, with remarks on psychogenetic defects after injuries of the brain, psychogenous war neurosis, lesions of the accessory sinuses and lacrimal passages, and finally the valuable chapter on plastic operations with numerous illustrations. There is a table of contents, and an index of subjects and names concludes the admirable work.

C. Zimmermann.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities

DEATHS

Dr. H. Ulrich, University of Vienna, died recently at the age of 44.

PERSONALS

Major-General G. S. Ryerson, of Toronto, will spend the winter in Southern Europe.

Dr. W. A. Schwartz of Phoenix, Arizona, has returned from a trip to the East.

Dr. Myles Standish is now established in his new office at 52 Hereford street, Boston.

Dr. L. Maud Carvill has been appointed Clinical Assistant at the Massachusetts Charitable Eye and Ear Infirmary.

Dr. H. B. Carpenter of Lancaster, N. H., has succeeded to the practice of the late Dr. A. J. Lance, and has removed to Portsmouth, N. H.

Dr. A. J. Ballantyne has been appointed Lecturer in Ophthalmology to the University of Glasgow, to succeed Dr. Maitland Ramsay, retired.

Dr. Allen Greenwood attended the meeting of the American Academy at Kansas City, where he gave a paper entitled "Lacrimal Sac Extirpation Simplified."

Dr. E. A. Meyers of Superior, Wisconsin, is taking a postgraduate course in Chicago. He will return to his old location, where he will continue in the practice of eye, ear, nose and throat.

Dr. Raphael Silva has resumed his post as Professor of Ophthalmology in the school of advanced studies of the University of Mexico, to which he had been chosen in 1916.

Dr. William Zentmayer of Philadelphia, by invitation of the Medical Society of the State of Virginia, read a paper before that body on the evening of October 28th, upon "Ocular Angiosclerosis."

Dr. Hans Barkan, Assistant Clinical Professor of Ophthalmology at Stanford University School of Medicine, has returned to active duty in that institution, after an absence of nearly two years.

Dr. T. H. Shastid has taken offices in the Lyceum Clinic, Lyceum Building, Duluth, Minnesota, where his practice will be limited to refraction and consultation. The doctor will continue to reside in the neighboring city of Superior, Wisconsin.

Dr. Thomas Collins Austin, formerly of the United States Army, announces the opening of offices at 619 Chamber of Commerce Building, Pasadena, California. Dr. Austin will limit his practice to diseases of the eye, ear, nose and throat.

Among the recipients of the F. A. C. S. at the recent meeting in Montreal, were the following ophthalmologists: Dr. C. D. Conkey, Duluth, Minnesota; Dr. C. E. Lum, Duluth, Minnesota; Dr. R. C. Smith, Superior, Wisconsin; Dr. C. C. McCullough, Fort William, Ontario, W. S. Hunt, Port Arthur, Ontario and Dr. M. H. Boerner, Austin, Texas.

Col. Wm. H. Wilmer of Washington, D. C., by invitation, read a paper before the Ophthalmic Section of the College of Physicians of Philadelphia on the evening of October 21st. Dr. Wilmer was entertained at dinner at the Union League by Dr. G. Oram Ring, Chairman of the Section, and was given an informal reception and smoker after the meeting by Dr. B. Alexander Randall, Professor of Otology at the University of Pennsylvania, at his residence 1717 Locust Street. Discussion of Dr. Wilmer's paper was opened from the standpoint of the internist by Dr. Hobart A. Hare of the faculty of the Jefferson Medical College; from the standpoint of the neurologist by Dr. F. X. Dercum of the same faculty, and from that of the ophthalmologist by Dr. George E. de Schweinitz and Dr. Howard Forde Hansell.

Colonel Casey A. Wood, one of the editors of the JOURNAL, has left for the Tropical Research Station of the New York Zoological Society, at Kartabo, British Guiana. He plans to spend the coming winter doing some work in the Station laboratory, on the comparative ophthalmology of birds and reptiles. As is well known in scientific circles, this neotropical Station has for its Director William Beebe the celebrated naturalist and writer. The introduction to his work on Tropical Life was written by Theodore Roosevelt, who spent some time making investigations at this Station. Colonel Wood proposes to make this work and collection in part the basis of a contemplated monograph on The Eye and Eyesight of Birds. It is interesting to note in this connection that Colonel Wood has recently presented to McGill College the Emma Sherer Wood Library of Ornithology, in honor of his wife who is a native of Montreal. The library comprises about nine hundred volumes besides numerous pamphlets and periodicals; and covers every subject which has to do with birds or bird life, and even extends into the field of natural history in general, as well as including the biographies of famous ornithologists. In the opinion of several experts in ornithology, this library when complete will compare favor-

ably with any ornithological collection of books in existence.

SOCIETIES

The first meeting of the New England Ophthalmological Society for this season was held Tuesday evening, November 6th, 1920.

The first Annual Clinical Congress of the California Section of the American College of Surgeons will be held in San Francisco, November 18th and 19th, 1920.

"The Eleventh Annual Meeting of the Oxford Ophthalmological Congress was held in Oxford in July. Among the Americans participating were Dr. S. Lewis Ziegler of Philadelphia, who presented a paper on "The Ocular Menace of Wood Alcohol Poisoning," and Dr. Luther C. Peter of Philadelphia, who opened a discussion on "Perimetric Methods."

The Chicago Ophthalmological Society has had, since last spring, a specially appointed committee attempting to work out the details of a contemplated plan for the Society to undertake postgraduate teaching of ophthalmology. The committee presented its report at the first meeting of the present season, October 18th. After a thorough discussion it was the opinion of a large majority of the members present, that the plan was, at least at the present time, impractical. The report was therefore rejected and the committee discharged.

At the October meeting of the Kansas City Eye, Ear, Nose and Throat Club, clinical cases were shown by Drs. Kimberlin, Schutz, Lorie, Lichtenberg, Roberts and Curran. Dr. Kimberlin's case was one of a myopia which will be reported in this journal. Dr. Schutz showed a case of sympathetic ophthalmia, eye now quiet with some useful vision remaining. Subconjunctival injections of cyanid had been used. He also showed an interesting injury case and one in which iridotomy had been done. Dr. Lichtenberg showed a case of Parinaud's conjunctivitis, and an injury case in which practically the whole iris had been torn loose. Dr. Curran's case showed in the two eyes the difference in depth of the anterior chamber before and after iridotomy for glaucoma.

At the meeting of the American Academy of Ophthalmology and Oto-Laryngology held at Kansas City, October 14, 15, 16, upon recommendation by the Council, the Society endorsed a resolution that hereafter Oto-Laryngological men can become members of the Society upon the same terms, only, as the ophthalmologists. The Committee for examinations of the Oto-Laryngologists was as follows: Joseph C. Beck, Chicago; T. S. Carmody, Denver; J. M. Ingersoll, Cleveland; Harris P. Mosher, Boston; R. C. Lynch, New Orleans; Ross Skillern, Philadelphia. The first examinations will take place in Boston at the next meeting of the American Medical Association. The next meeting of the Society will take place in Philadelphia. The three days following the meeting will be devoted to postgraduate work under the supervision of a committee composed of: Harry S. Gradle, Chi-

cago; W. P. Wherry, Omaha, and Meyer Weiner, St. Louis. Postgraduate lectures will be given by men of national reputation. For this course a registration fee of five dollars will be charged.

MISCELLANEOUS

Under the will of the late Jacob H. Schiff, of New York, the New York Association for the Blind received a bequest of ten thousand dollars.

A recent news item in the daily press repeats the statement that, among the Maoris, who are now Christianized, the belief still survives from heathen times that the soul of each human being resides in the left eye.

Dr. Lucien Howe of Buffalo, has given to the American Ophthalmological Society the sum of fifteen hundred dollars, the income from which is to provide a suitable gold medal for a thesis on ophthalmology, open to candidates whether or not members of the Society.

Health Commissioner Copeland, of New York City, has made public a letter recently written to Secretary of State Hugo, in which he suggests that amendments be made to the sanitary code making it impossible for those with defective vision or hearing to become chauffeurs.

Dr. J. W. Jervy, of Greenville, South Carolina, has been devoting much time to the frequent confusion of trachoma and conjunctival folliculosis in school children, as a result of recent compulsory physical examinations. He very properly takes the view that trachoma is rare, and folliculosis is very prevalent.

The National Committee for the Prevention of Blindness states that out of one hundred thousand blind in the United States more than fifty per cent are needlessly so. The national council estimates there are two hundred thousand eye injuries in our land; and the International Association of Labor Legislation has issued a list of fifty-six industrial poisons, of which thirty-six affect the eyes.

The Valentin Haüy Association for the Welfare of the Blind has deposited in six municipal libraries of Paris a collection of special books printed in Braille type, to be placed at the disposal of blind readers residing in the department of the Seine, under the same terms that govern the loans of the ordinary collections in the libraries. The books may be removed to the homes of the readers, and they will be replaced at intervals from funds provided by this Association.

Papers and discussions by members of the Illuminating Engineering Society are frequently of great interest and value to the ophthalmologist, especially in the lines of physiologic optics. This proved to be the case at the Convention of the Society recently held in Cleveland. Among other papers of exceptional interest we would mention particularly that of Mr. P. G. Nutting on "Optical Principles in Illuminating Engineering" and the one on "Effect of Variations of Intensity of Illuminating on Functions of Importance to the Working Eye," by Ferree and Rand.

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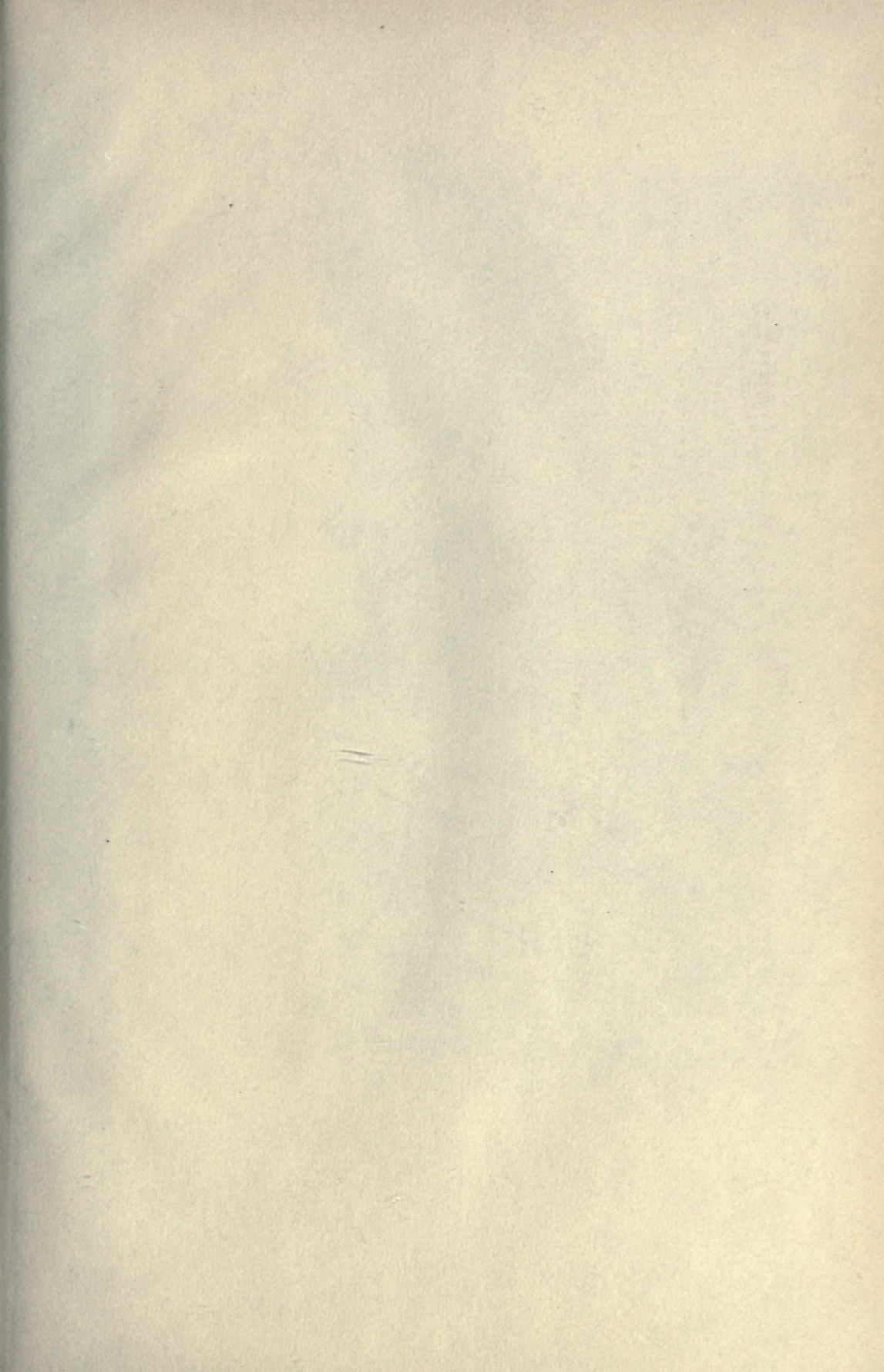
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